CITY OF LODI
INFORMAL INFORMATIONAL MEETING
"SHIRTSLEEVE" SESSION
CARNEGIE FORUM, 305 WEST PINE STREET
TUESDAY, FEBRUARY 7, 2006

An Informal Informational Meeting ("Shirtsleeve" Session) of the Lodi City Council was held Tuesday, February 7 2006, commencing at 7:05 a.m.

A. ROLL CALL

Present: Council Members – Beckman, Hansen, Johnson, Mounce, and Mayor Hitchcock

Absent: Council Members – None

Also Present: City Manager King, City Attorney Schwabauer, and City Clerk Blackston

B. TOPIC(S)

B-1 "Presentation on 2005 Urban Water Management Plan, update on surface water treatment plant, and proposed Recycled Water Master Plan"

Public Works Director Prima explained that the Urban Water Management Plan is required by the State every five years. It will be brought to Council for approval in March. He mentioned that on February 9 the Woodbridge Irrigation District (WID) Board will vote on whether to approve the City's request to extend by four years the period of time Lodi can bank water under its agreement. Mr. Prima recommended that the City proceed with a surface water treatment plant.

With the aid of an overhead presentation (filed), Glenn Hermanson, Project Manager for RMC Water and Environment, stated that there would be a two-week public review period for the Water Management Plan. A 1.5% growth rate was used in its preparation. In 2005, Lodi used 17,300 acre feet of water. The groundwater levels in Lodi are decreasing at a rate of five inches per year. The City has a contract with WID for 6,000 acre feet of surface water from the Mokelumne River for a 40-year period. Some of the City's treated effluent is recycled and used to irrigate farmland near the treatment plant. Based on recent calculations, it was determined that Lodi's sustainable yield from the groundwater is 15,000 acre feet per year. Available recycled water will grow from 7,200 acre feet per year in 2005 to approximately 10,380 acre feet in 2030. Without water meters, the City will exceed its groundwater and surface water supplies in 2018 and with water meters this is delayed to 2029.

In reply to Council Member Mounce, Mr. Prima reported that staff is working with Stockton on studies for its use of Lodi's recycled water. City staff will be submitting a grant application to the State. He noted, however, that if this project were to occur it would take away the recycled water supply that could otherwise be counted in Lodi's Urban Water Management Plan.

Wally Sandelin, City Engineer, recalled that in November 2005 staff gave a presentation to Council on alternatives for the WID surface water action plan and has now developed a conceptual schedule for implementation of the "treat and drink" option, in which a water treatment facility would be built with transmission facilities throughout the community. In March, staff will ask Council for authorization to begin soliciting consultant services to begin the initial studies. The project is estimated at up to $25 million, which would be paid entirely by new development. The plant could be online within four years and would involve chlorination of all the City's water.

Mayor Hitchcock asked that staff provide Council with more information on groundwater recharge options.

Mr. Prima explained that he is recommending the surface water treatment plant, due to considerations related to wastewater discharge salinity requirements and the long-term sustainability of agriculture and urban life in the valley. He believed that salt build up in the Central Valley would be a significant issue in the future. The standard water quality goal for the Delta is 450 total dissolved solids (TDS) and the City's discharge is now 440 TDS. The proposed treatment plant would lower the salinity of the wastewater, making it more suitable for reuse. He acknowledged that, due to the size of the Westside project, it is feasible that development could help finance the plant; however, development fees would have to be increased substantially to accomplish it.

Council Member Beckman commented that if the City does not have facilities in place to do groundwater recharge there will be no opportunities to partner with other water entities on such a project. Mr. Beckman stated that he was very much in favor of groundwater recharge.

City Attorney Schwabauer stated that, according to the information provided by the water consultants, the projected growth in the City's water demand would make it appropriate to place the entire cost of the treatment plant on new development.

Mayor Hitchcock pointed out that it appears the treatment plant option is being recommended based upon the proposed Westside development. She recalled staff had previously supported the groundwater recharge option.

Council Member Mounce felt that a decision should be made expediently with consideration to the future, long-term value of water.

C. COMMENTS BY THE PUBLIC ON NON-AGENDA ITEMS

None.

D. ADJOURNMENT

No action was taken by the City Council. The meeting was adjourned at 8:12 a.m.

ATTEST:

Susan J. Blackston
City Clerk

AGENDA ITEM

CITY OF LODI
COUNCIL COMMUNICATION

TM

AGENDA TITLE: **Presentation on 2005 Urban Water Management Plan, Update on Surface Water Treatment Plant and Proposed Recycled Water Master Plan**

MEETING DATE: **February 7, 2006 (Shirtsleeve Session)**

PREPARED BY: ***Public Works Director***

RECOMMENDED ACTION: Information only.

BACKGROUND INFORMATION:

Urban Water Management Plan

Background
On July 6, 2005, Council authorized Public Works staff to solicit Statements of Qualifications from engineering firms for preparing the 2005 Urban Water Management Plan Update, Integrated Water Management Plan, Reclaimed Water Master Plan and a Water Master Plan for the General Plan Update. Three firms were chosen to assist the City in preparing the above referenced documents.

On September 7, 2005, Council authorized RMC Water and Environment to prepare the City's 2005 Urban Water Management Plan (UWMP). At this meeting, Council also authorized West Yost & Associates to explore the potential for selling all or a portion of the Woodbridge Irrigation District (WID) surface water supply of 6,000 acre-feet per year until a plan for utilizing the surface supply is implemented.

Purpose of the Urban Water Management Plan
Urban water suppliers providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet annually (afa) are required by the Urban Water Management Planning Act (Act) to update their UWMP every five years. The plans are submitted to the Department of Water Resources (DWR) for approval. The 2005 UWMP Update is the fourth update prepared and submitted by the City of Lodi.

The State of California's strategic objective for requiring urban water management plans is to assist and encourage integrated regional water planning. The UWMP can be used as a source document for an Integrated Regional Water Management Plan (IRWMP) and is a condition for eligibility for Proposition 50 Chapter 8 grant funds and drought assistance. The City has recently applied for a Proposition 50 Grant to assist in the PCE cleanup and having a current UWMP is a condition of receiving the grant.

The City of Lodi recognizes its water supply is limited and maintaining a reliable water supply is vital to the health of our citizens and local economy. The UWMP is being used as a planning tool to assure long term and reliable water availability for the City of Lodi.

APPROVED: James R. Krueger
for Blair King, City Manager

Components of the UWMP
The UWMP contains water planning and management information covering the time period between 2005 and 2030. The UWMP, in accordance with the Act, includes chapters that discuss the water service area, water supply, water demand, demand management measures, water supply reliability, water quality impacts on reliability, wastewater and recycled water, supply and demand comparisons, implementation of the plan and water shortage contingencies.

Summary of UWMP Findings

1. Water Supply The City of Lodi overlies a portion of the Eastern San Joaquin Groundwater Basin that has been declared "Overdrafted". Currently, the City of Lodi relies solely on groundwater wells to provide its municipal supply of potable water. As part of the UWMP, a revised safe yield value of 15,000 afa is used to determine the sustainable ground water supply. In addition to ground water, the City has purchased 6,000 afa from the Woodbridge Irrigation District (WID). A graphic representation of Lodi's supply and demand condition is presented in Exhibit A.

The 2005 UWMP also includes 7,200 afa of recycled water as a firm supply of water available for future use by the City. While this component reflects a significant portion of the City's overall supply portfolio, the infrastructure and demand has not yet been realized.
Finding: The City's overall firm water supply is expected to increase to 21,000 afa by the year 2030, excluding recycled water sources. The City plans to negotiate with WID to purchase additional surface water in the future.

2. Water Demand The total water production for the City of Lodi in 2005 is 17,300 acre-feet. The demand projections include a 1.5% annual population growth coupled with an estimated reduction in per capital use of 15% due to conservation encouraged by installing residential water meters.
Finding: Lodi's annual water demand is projected to slightly exceed 21,000 afa by the year 2030. Additional surface and/or recycled water supplies will be needed to meet the projected demand. Exhibit A reflects the supply vs. demand but does not include any recycled water.

3. Demand Management Measures Demand Management Measures (DMMs) are requirements in the UWMP Act and are intended to identify ways that communities can reduce water consumption. DMMs are measures taken to reduce the overall water demand within a service area and include such items as water surveys, residential plumbing retrofit programs, water system audits/leak detection, etc.
Finding: The City is currently in compliance with or in the process of complying with the UWMP Act on 9 of 13 applicable DMMs.

4. Water Supply Reliability This section evaluates the reliability associated with the City's surface, ground and recycled water supplies. The analysis takes into account climatic changes that may occur up to the UWMP planning horizon of 2030.
Finding: Even with surface water curtailments during multiple dry years, the City's water supply is relatively consistent and would not be significantly impacted from environmental, legal and/or climatic factors.

5. Water Quality Impacts on Water Supply This section assesses the potential for impacts to the City's water supply due to water quality and notes that current groundwater treatment is being performed on DBCP. The section also briefly discusses pending measures to mitigate the City's PCE/TCE groundwater contamination.

Finding: The assessment reflects that the City is well equipped to handle those constituents present in its supply sources.

6. Wastewater and Recycled Water California Water Code requires the UWMP to provide information on recycled water and its potential for use as a water source. This section identifies this potential by discussing the City's wastewater treatment plant processes, other agency coordination and projected wastewater disposal volumes.
Finding: The report identifies that by 2025, the City may need to rely on a portion of the available recycled water to supplement future groundwater and surface water supplies. Staff proposes to initiate a Recycled Water Master Plan Study in the near future and fully anticipates that recycled water will be utilized prior to 2025.

7. Supply and Demand Comparison California Water Code requires the UWMP to address projected water supply during normal, single dry and multiple dry years and compare that supply with project demands.
Finding: The assessment indicates the City will have sufficient water supply to meet all existing and projected water demands during normal, single dry and multiple dry years.

8. Water Shortage Contingency Plan The California Water Code requires a water shortage contingency plan to identify the stages of action needed to address a water supply shortage of varying degrees of severity, as well as discussion regarding the financial impacts that may be realized by the City during a water shortage.
Finding: The City has the required Water Shortage Contingency Plan in place.

9. Adoption and Implementation of the UWMP The UWMP will be made available to the public as of February 15, 2006. At that time, the public review period will be opened and Council will be requested to set the Public Hearing date for March 1, 2006. Council will also be requested to approve the 2005 UWMP Update during the March 1, 2006, meeting.

During the review period, copies of the UWMP will be made available to the public via the City's website, as well as the Lodi Public Library. Copies will also be sent to the *Lodi News Sentinel* and other agencies as requested.

Surface Water Program

On November 1, 2005, staff met with the City Council at a Shirtsleeve Session to present the recommended Surface Water Action Plan. Alternatives presented to the Council included "Treat and Drink" or "groundwater recharge". On an interim basis, the alternatives presented included "selling the water" and "partnering with other agencies on a joint groundwater recharge program". At the time, staff was requested to return to Council with additional cost and implementation information.

1. "Treat and Drink"

Staff recommends the "Treat and Drink" option based upon the following:

a. A conjunctive use water program that includes treating and distributing Mokelumne River water will reduce salt concentrations in the City's wastewater discharge. Allowable salt levels in the discharges to the Delta are expected to be lowered in the future by the Regional Board.

b. Treating and distributing surface water will provide the highest percentage of in lieu recharge to the groundwater resource that underlies the City.
c. Capital costs for the facilities will be paid by new development.

Capital costs for the construction of a water treatment, storage, and transmission facilities are now estimated to be in the range of $20 million to $25 million. Staff research has narrowed the mechanical treatment options to ultrafiltration through consultations with design professionals and visitations to three new ultrafiltration water plants.

The water treatment facilities will be designed to fully implement the current annual allotment of WID surface water and include provisions for future expansion. The facilities will treat and distribute at least 6,000 acre-feet per year when brought on line.

The City cost to deliver treated surface water to its customers would be greater than the current ground water system. Additional study is required to establish the rate impacts associated with the "Treat and Drink" option.

Implementation Timeline A preliminary timeline for construction of the water treatment facilities has been prepared and it shows that, if the process begins July 1, the treatment and transmission facilities could be operational within four years. The timeline is presented in Exhibit B.

Decision Tree Several decisions will be required by the City Council in the future to implement the final plan for using the WID surface water supply. A preliminary decision tree, based upon the "Treat and Drink" alternative, has been prepared that provides the City Council a summary of the key steps in the program. A copy is attached as Exhibit C.

Woodbridge Irrigation District Agreement Amendment A letter has been presented to the WID General Manager requesting four additional years of "banking" be included in the Water Purchase Agreement. The details of this amendment are in discussion at the staff level and will be brought to the City Council in the future for discussion and approval. We believe we will be able to work out some arrangement that will prevent Lodi from losing the water.

2. "Groundwater Recharge" Staff recommends that interim groundwater recharge be considered in the near term to provide some beneficial use of the City's captured storm water to the Region during development of the final water facilities. Meetings have occurred with Stockton East Water District, North San Joaquin Water Conservation District and Woodbridge Irrigation District regarding the implementation of a pilot-scale recharge basin adjacent to Micke Grove Park. The project is partially funded by a Corps of Engineers Grant and is expected to begin in March 2006.

Use of the WID water for recharge will have minimal cost at the Micke Grove location but the actual benefit to City of Lodi residents will also be minimal. It is staff's recommendation that we continue participating in recharge project discussions, and that Lodi receives some reimbursement for the water.

3. "Water Sale" On September 7, 2006, City Council authorized retaining the services of West Yost & Associates to investigate the possibility of short-term water sales to users within the region and State. Results of initial discussions with water purveyors have not been encouraging. We will be receiving a letter report from West Yost & Associates which will be provided to the Council. Staff does not recommend pursuing this alternative.

Recycled Water Program

The Urban Water Management Plan represents that recycled water will be a component of the Lodi Water Supply Master Plan. The UWMP forecasts the requirements for recycled water or another source between 2018 and 2029. This time frame would depend on actual growth and water conservation (metering) results. On February 1, 2006, the Council approved the application to the State for a Recycled Water Planning Grant.

In the near future, the Council will be asked to approve the consultant's services agreement to prepare a Lodi Recycled Water Master Plan (RWMP). The key elements of that scope of services are provided below and the scoping document is attached as Exhibit D.

1. Market Assessment for recycled water demand
2. Alternates to using recycled water and evaluations thereof
3. Interim usage of WID water supply
4. Community outreach
5. Preparation of the RWMP

As part of the City of Lodi, City of Stockton Settlement Agreement for the White Slough Sphere of Influence, those parties agreed to evaluate a Proposed Water Reuse Project. This study will evaluate the feasibility of irrigating public and private landscaping in newly-constructed areas that lie between Lodi and Stockton. The process to select the consultant to perform this study has been initiated at the staff level.

FISCAL IMPACT: Not applicable at this time.

FUNDING AVAILABLE: Not applicable.

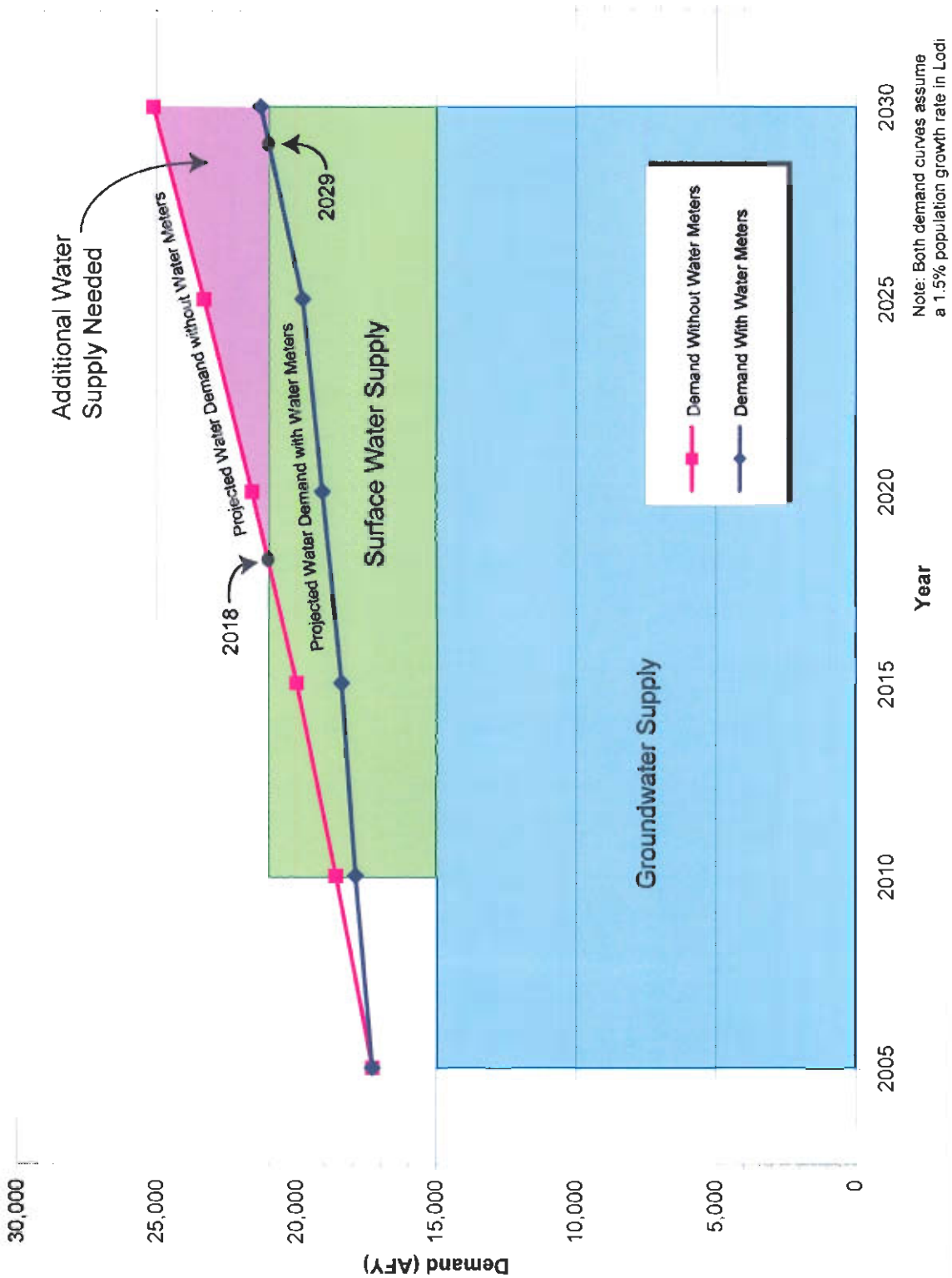
Richard C. Prima, Jr.
Public Works Director

Prepared Charles Swimley, Senior Civil Engineer

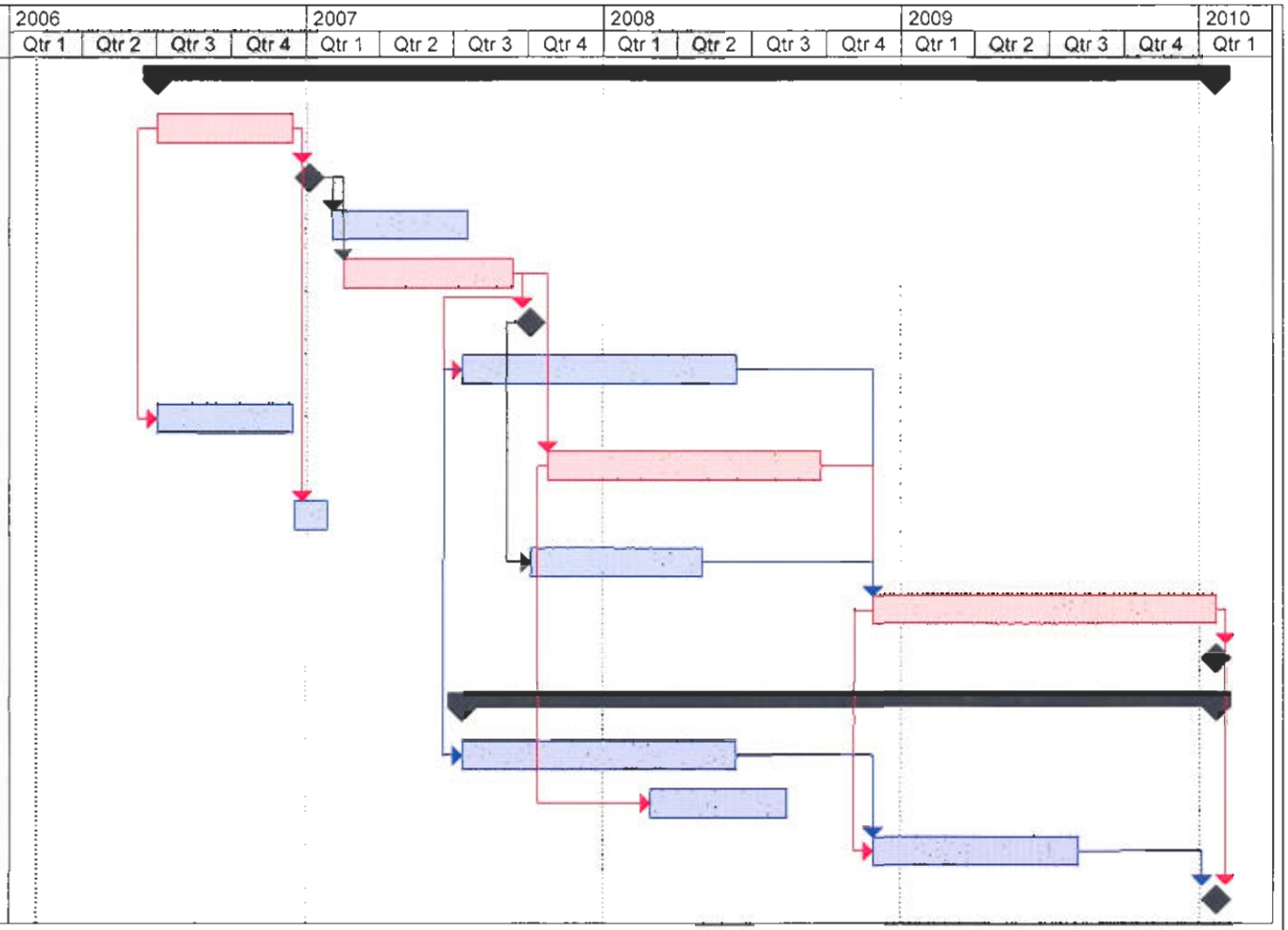
RCP/CES/pmf

Attachments

EXHIBIT A


Additional Water Supply Needed
Projected Water Demand without Water Meters
Projected Water Demand with Water Meters
2018
2029
Surface Water Supply
Groundwater Supply
Demand Without Water Meters
Demand With Water Meters
Demand (AFY)
30,000
25,000
20,000
15,000
10,000
5,000
0
2005
2010
2015
2020
2025
2030
Year
Note: Both demand curves assume a 1.5% population growth rate in Lodi

ID	Task Name
1	**Water Treatment Plant**
2	Siting Study
3	Approval of Site Selection
4	Pilot Membrane Plant
5	Preliminary Design Report
6	Approval of PDR
7	Environmental Review
8	Permitting
9	Plant Design
10	Preliminary Financing Plan
11	Financing Plan
12	Plant Construction/Startup
13	Acceptance of Improvements
14	**Transmission System**
15	Environmental Review
16	Design
17	Construction
18	Acceptance of Improvements



Project: Sched 1-13-06
Date: Fri 2/3/06

Task		Summary		Rolled Up Progress	
Critical Task		Rolled Up Task		Split	
Progress		Rolled Up Critical Task		External Tasks	
Milestone	◆	Rolled Up Milestone	◇	Project Summary	

EXHIBIT B

Exhibit C

WATER TREATMENT PLANT DECISION TREE

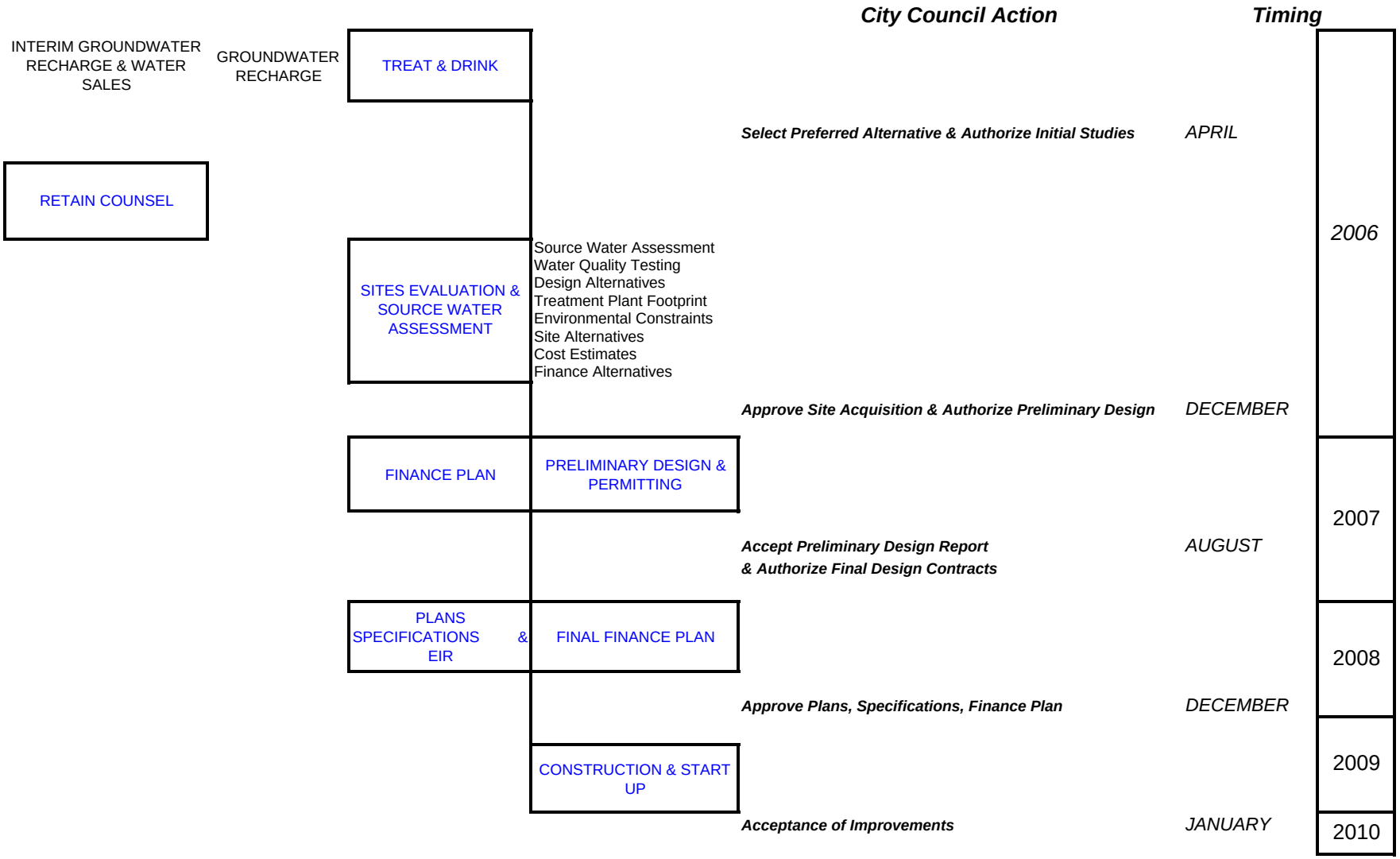


EXHIBIT D

RMC
Water and Environment

Los Angeles
Sacramento
San Francisco
San Jose
Walnut Creek

January 26, 2006

Mr. Charles Swimley, Jr.
Senior Civil Engineer
Public Works Department
City of Lodi
221 West Pine Street
P.O. Box 3006
Lodi, CA 95241-1910

Subject: Recycled Water Master Plan

Dear Mr. Swimley:

At the City of Lodi's request, RMC Water and Environment (RMC) is pleased to present this proposal to prepare a Recycled Water Master Plan for the City.

BACKGROUND
The City of Lodi recognizes several benefits for developing a Recycled Water Master Plan (RWMP) to define the recycled water market potential and identify recommended projects to deliver recycled water for non-potable uses within the City and proposed areas of annexation:

- **Reduces Wastewater Discharges.** The City of Lodi, like other wastewater dischargers in the Central Valley, is facing increasingly stringent wastewater discharge regulations. Increased use of recycled water is a key strategy for complying with these future discharge regulations and helps to position the City for ultimately achieving zero discharge.

- **Improves Water Supply Reliability.** Groundwater is currently the sole source of water supply used within the City. With the groundwater basin in a state of overdraft, the City of Lodi is in need of alternative supply sources to meet future water demands, which are projected to more than double between 2005 and 2040. Use of recycled water to serve non-potable demands within this area would preserve groundwater supplies for potable uses and provide additional supply reliability for the City.

- **Provides Interim Solution for Use of Supplemental WID Supply.** The City of Lodi currently contracts with Woodbridge Irrigation District (WID) for an annual surface water supply of 6,000 AFY which is currently unused because the City does not yet have facilities in place to develop that supply. Early construction of recycled water distribution infrastructure could provide the City of Lodi with an interim usage of the raw water supplies from WID to serve non-potable irrigation demands.

The scope of work presented below is for development of a Recycled Water Master Plan which will evaluate the potential for recycled water use within the City limits and proposed westside annexation areas

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Innovative Solutions for Water and the Environment

SCOPE OF WORK
RMC has identified the following tasks to complete the scope of work for this project.

Task 1 Project Coordination
This task involves the coordination and communications between the RMC team and the City throughout the duration of the project, and the Quality Assurance/ Quality Control (QA/QC) activities for project deliverables. An initial kickoff meeting will be held with the Project Team to confirm overall approach and schedule. RMC will also provide the City with monthly status updates for the project.

Deliverables:
1. Kick off Meeting
2. Monthly Status Reports

Assumptions:
- RMC will attend at total of four (4) coordination meetings (including the Kickoff meeting) with the City to discuss project status as needed.

Task 2 Recycled Water Feasibility Study
RMC will document the recycled water potential in the City of Lodi by evaluating potential markets and confirming the quantity and quality of available recycled water supplies. As part of this task, RMC will complete the following:

Key Assumptions. RMC will prepare a technical memorandum documenting the key assumptions that will be used in the development of the RWMP, including but not limited to: market assessment methodology, design criteria, and cost criteria. The TM will be revised based on comments from the City.

Data Collection and Review. RMC will collect and review any pertinent information for this project (e.g., previous planning reports; land use information; water use records to determine non-potable demands; recycled/raw water supply and quality data; available survey/geotechnical data; etc).

Market Assessment. RMC will build upon previous studies to conduct a detailed recycled water market assessment for the City. This assessment will involve the following tasks:

- *User Identification*. RMC will identify both urban, industrial and agricultural users within and surrounding the City of Lodi that could potentially use recycled water to meet non-potable demands. This will include identification of both existing and future recycled water users.
- *Demand Assessment*. Using water use records and evapotranspiration (E/T) data, RMC will determine the timing and quantity of non-potable demands for each of the potential recycled water users identified. This will include quantification of average annual demands, peak month demands, and peak hour demands.
- *Water Supply Assessment.* RMC will document the timing and quantity of recycled water and raw water WID supplies available to serve the non-potable demands within and around the City of Lodi, including peak month and annual supply availability.
- *Water Quality Assessment*. RMC will gather water quality data for the various water supply sources currently used in the study area, including (1) existing recycled water; (2) raw surface water (Mokelumne River) supplies; and (3) groundwater supplies. RMC will also evaluate water quality data projected for future recycled water supplies when the Lodi starts using the surface water supplies from WID.

  RMC will evaluate the quality of each of these supplies in relation to the water quality needs of the potential urban, industrial and agricultural recycled water users. This will include evaluation of various water quality parameters of interest (e.g., total dissolved solids (TDS), chloride, sodium, ammonia, nitrate, nitrite, etc) to determine suitability as an irrigation supply, especially for sensitive crops types.

Recycled Water Feasibility Workshop. RMC will hold a workshop with the City and other interested stakeholders to present the preliminary results from the recycled water market assessment and review assumptions and outstanding items.

Deliverables:

1. Draft and Final Key Assumptions TM
2. Project Feasibility Workshop

Assumptions:

- Pertinent information will be readily accessible.
- The Recycled Water Feasibility workshop will be a half-day workshop, hosted by the City of Lodi

Task 3 Alternatives Development and Evaluation

RMC will develop and evaluate recycled water alternatives for delivering recycled water and non-potable water to potential recycled water customers within the City of Lodi. This task will involve the following:

- **Development of Conceptual Alternatives.** Based on the results of the market assessment, RMC will develop conceptual alternatives, including preliminary alignments (e.g. specific pipeline routes) for the recycled water and non-potable distribution systems, pumping/storage facility locations, and potential demands served by each alternative. Potential satellite treatment opportunities will be developed as appropriate. These conceptual alternatives will include an interim alternative to use raw water WID supplies to serve non-potable demands. RMC will prepare a technical memorandum describing the Conceptual Alternatives for the City's review and feedback.

- **Alternative Refinement and Evaluation.** Based on preliminary feedback on the conceptual alternatives, RMC will refine the conceptual alternatives. A hydraulic model (e.g. H2O Map) will be used to determine facility requirements and sizing (e.g., pipeline, storage, pumping) for each alternative. In addition, planning level cost estimates (including capital costs, operation and maintenance costs, and unit costs) will be developed for each alternative.

- **Alternatives Evaluation Workshop.** RMC will present the preliminary results of the alternatives evaluation at a workshop with the City and other interested stakeholders.

Deliverables:

1. Conceptual Alternative TM
2. Alternatives Evaluation Workshop

Assumptions:

- No more than five recycled water alternatives, including a "No Project Alternative", will be developed.
- RMC will develop a hydraulic model using H2O Map (or similar) for determination of distribution facility sizing requirements.
- The Alternatives Evaluation Workshop will be a half-day workshop.

Task 4 Recycled Water Outreach

RMC will conduct various outreach activities to potential recycled water users and the general public in order to educate them on the benefits of recycled water use. This task will involve:

- **Initial Meetings with Potential Recycled Water Users/Opinion Leaders.** RMC will meet with the largest potential recycled water users and opinion leaders (e.g., major vineyards) to describe the purpose of the project, gage their potential interest in using recycled water and discuss any preliminary concerns they may have relating to water quality and supply reliability.

- **Follow-Up Meetings with Potential Recycled Water Users.** Following development of recycled water alternatives, RMC will hold follow-up meetings with the largest potential recycled water uses to present the alternatives and discuss any concerns they may have with implementation of the project. The results of these meetings will be incorporated into the recycled water master plan.
- **General Public Outreach.** RMC will develop a recycled water brochure that describes the proposed project, the benefits of recycled water and safety of its use. RMC will also help to facilitate a public workshop to address any questions and/or concerns that the public may have.

Deliverables:

1. Large User Meetings
2. Public Outreach Materials
3. Public Workshop

Assumptions:

- There will be a total of 5 initial meetings and 5 follow-up with the largest potential recycled water users
- The budget for development of the recycled water brochure will be limited to $10,000.

Task 5 Recycled Water Master Plan

This task involves development of Recycled Water Master Plan for the City of Lodi. The RWMP will include at least two phases – an interim phase that involves use of recycled water infrastructure to convey raw WID supplies; and a long-term phase that involves serving the annexation area, and future development located in the General Plan's sphere of influence.

- **Draft RWMP.** RMC will develop a Draft RWMP that documents the results from Tasks 2 -4 and presents the recommended recycled water project. Specifically, the Draft RWMP will include
  - Specific alignments, locations and sizes for the recycled water and non-potable system alternatives and recommended project(s)
  - Preliminary cost estimates (capital, O&M, annual) for each alternative and the recommended project(s)
  - Potential funding/financing options to implement the recommended recycled water and non-potable projects,
  - A draft implementation plan that outlines strategies for additional recycled water outreach, permitting, and environmental compliance for the recommended project(s).
  - Potential policy option for developers as it relates to the installation of recycled water and/or non-potable distribution piping.

- **Draft RWMP Workshop.** RMC will facilitate a workshop with City staff and other interested stakeholders to review the recommendations of the Draft RWMP and solicit comments and feedback.

- **Final RWMP.** RMC will prepare a Final RWMP that incorporates all comments received on the Draft.

Deliverables:

1. Draft Master Plan
2. Final Master Plan

Assumptions:

- The Draft Master Plan will be provided electronically.
- The Master Plan Workshop will be a half-day workshop.
- Ten (10) copies of the Final Master Plan will be printed and distributed to the City.

FEE ESTIMATE
The fee estimate and for this scope of work is attached.

SCHEDULE
The tentative schedule for this scope of work is attached.

RMC greatly appreciates this opportunity to continue providing our consulting services to the City of Lodi. If you have any questions or require further information, please do not hesitate to call me at 415.321.3414.

Very truly yours,
RMC Water and Environment

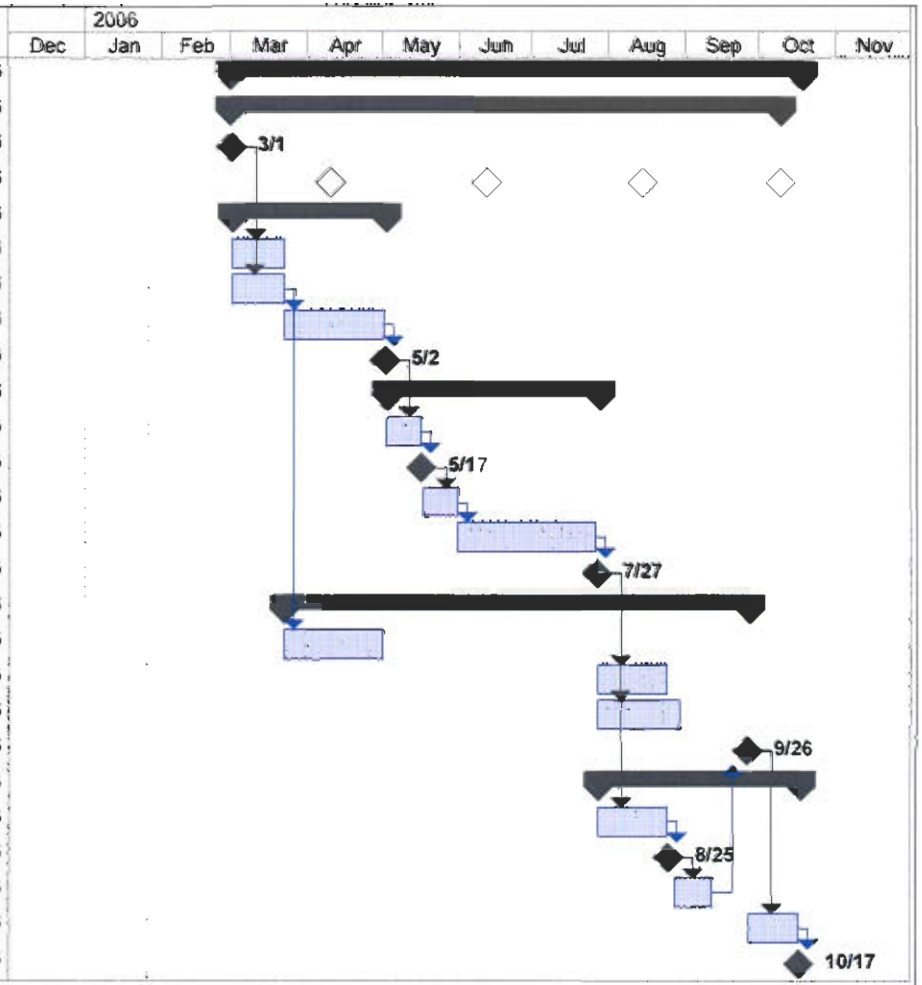
Rachael M. Wark, P.E.
Senior Project Manager

City of Lodi
Recycled Water Master Plan

Fee Estimate

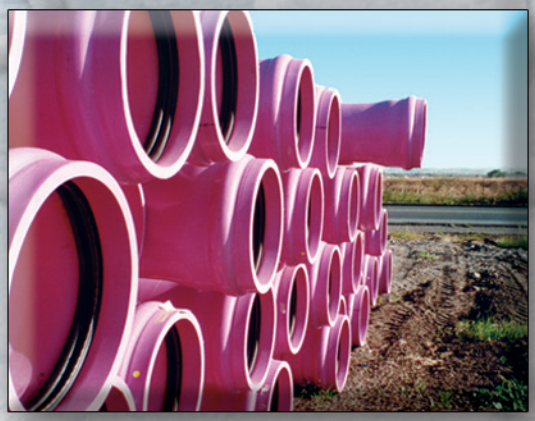
Task	Description	RMC Labor Hours						RMC Labor ($)	Sub Costs	ODCs ($)	Mark-up (10%)	TOTAL COST ($)
		PIC	PM	PE 2	PE 1	Admin	*Total Hours*		Lodi Graphic Design Firm			
	2005	$205/hr	$190/hr	$145/hr	$130/hr	$100/hr						
1.0	**PROJECT COORDINATION**	**22**	**44**	**0**	**0**	**9**	**75**	**$13,800**	**$0**	**$400**	**$40**	**$14,240**
	Project Coordination	14	40			9	*63*	$11,400	$0	$400	$40	$11,840
	QA/QC	8	4				*12*	$2,400	$0		$0	$2,400
2.0	**B RECYCLED WATER FEASIBILITY STUDY**	**14**	**50**	**120**	**48**	**0**	***232***	**$36,100**	**$0**	**$400**	**$40**	**$36,540**
	Key Assumptions TM	2	6	20			*28*	$4,500	$0		$0	$4,500
	Data Collection		8	24			*32*	$5,000	$0	$200	$20	$5,220
	Market Assessment	8	24	60	40		*132*	$20,100	$0		$0	$20,100
	RW Feasibility Workshop	4	12	16	8		*40*	$6,500	$0	$200	$20	$6,720
3.0	**ALTERNATIVE ANALYSIS**	**14**	**44**	**84**	**80**	**0**	***222***	**$33,900**	**$500**	**$200**	**$70**	**$34,670**
	Development of Conceptual Alts - TM	2	8	20	12		*42*	$6,400	$500		$50	$6,950
	Alternative Refinement and Evaluation	8	24	48	60		*140*	$21,000	$0		$0	$21,000
	Alternative Evaluation Workshop	4	12	16	8		*40*	$6,500	$0	$200	$20	$6,720
4.0	**RECYCLED WATER OUTREACH**	**30**	**64**	**72**	**0**	**0**	***166***	**$28,800**	**$8,000**	**$1,000**	**$900**	**$38,700**
	Large Recycled Water User Meetings	24	40	40			*104*	$18,300	$0		$0	$18,300
	Education Materials	2	8	16			*26*	$4,300	$8,000	$500	$850	$13,650
	Public Workshop	4	16	16			*36*	$6,200	$0	$500	$50	$6,750
5.0	**RECYCLED WATER MASTER PLAN**	**14**	**44**	**100**	**56**	**0**	***214***	**$33,100**	**$1,500**	**$1,000**	**$250**	**$35,850**
	Draft Master Plan	8	24	60	32		*124*	$19,100	$1,000		$100	$20,200
	Draft Master Plan Workshop	4	8	16	8		*36*	$5,700	$0		$0	$5,700
	Final Master Plan	2	12	24	16		*54*	$8,300	$500	$1,000	$150	$9,950
SUBTOTAL												
Subtotal Hours		*94*	*246*	*376*	*184*	*9*	*909*					
Subtotal Cost								$145,700	$10,000	$3,000	$1,300	$160,000

ID	Task Name	Duration	Start	Finish
1	**Lodi Recycled Water Master Plan**	**165 days**	**Wed 3/1/06**	**Tue 10/17/06**
2	**Task 1 - Project Coordination**	**159 days**	**Wed 3/1/06**	**Mon 10/9/06**
3	Kickoff Mtg	1 day	Wed 3/1/06	Wed 3/1/06
4	**Coordination Meetings**	**131 days**	**Mon 4/10/06**	**Mon 10/9/06**
9	**Task 2 - RW Feasibility Study**	**44 days**	**Thu 3/2/06**	**Tue 5/2/06**
10	Key Assumptions TM	15 days	Thu 3/2/06	Wed 3/22/06
11	Data Collection	15 days	Thu 3/2/06	Wed 3/22/06
12	Market Assessment	28 days	Thu 3/23/06	Mon 5/1/06
13	RW Feasibility Workshop	1 day	Tue 5/2/06	Tue 5/2/06
14	**Task 3 - Alternative Analysis**	**62 days**	**Wed 5/3/06**	**Thu 7/27/06**
15	Develop Conceptual Alts	2 wks	Wed 5/3/06	Tue 5/16/06
16	Submit TM	1 day	Wed 5/17/06	Wed 5/17/06
17	City Review	2 wks	Thu 5/18/06	Wed 5/31/06
18	Alt Evaluation	40 days	Thu 6/1/06	Wed 7/26/06
19	Alts Evaluation Workshop	1 day	Thu 7/27/06	Thu 7/27/06
20	**Task 4 - Recycled Water Outreach**	**134 days**	**Thu 3/23/06**	**Tue 9/26/06**
21	Initial Meetings with Targeted Us	28 days	Thu 3/23/06	Mon 5/1/06
22	Follow-Up Meetings with Target	20 days	Fri 7/28/06	Thu 8/24/06
23	Outreach Materials	23 days	Fri 7/28/06	Tue 8/29/06
24	Public Meeting	1 day	Tue 9/26/06	Tue 9/26/06
25	**Task 5 - RWMP**	**58 days**	**Fri 7/28/06**	**Tue 10/17/06**
26	Prepare Draft	20 days	Fri 7/28/06	Thu 8/24/06
27	Submit Draft	1 day	Fri 8/25/06	Fri 8/25/06
28	City Review	11 days	Mon 8/28/06	Mon 9/11/06
29	Prepare Final	14 days	Wed 9/27/06	Mon 10/16/06
30	Submit Final	1 day	Tue 10/17/06	Tue 10/17/06



Project: Lodi RWMP Schedule_26Jan
Date: Thu 1/26/06

Task		Milestone		External Tasks	
Split		Summary		External Milestone	
Progress		Project Summary		Deadline	



City of Lodi
2005 Urban Water Management Plan

DRAFT

February 2006

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Los Angeles
Sacramento
San Francisco
San Jose
Walnut Creek

February 3, 2006

City of Lodi
Charles E. Swimley, Jr.
Senior Civil Engineer
221 West Pine Street
Lodi, California, 95241

Subject: 2005 Urban Water Management Plan

Dear Mr. Swimley:

RMC is pleased to submit this Draft of the City of Lodi 2005 Urban Water Management Plan.

We greatly appreciate the support and guidance that we have received thus far from the City, and we look forward to incorporating additional comments and suggestions as this Draft is reviewed. In particular, we would like to acknowledge the efforts of Frank Beeler, who has been instrumental in obtaining and interpreting the information necessary for this report.

If you have any questions, please don't hesitate to contact us at (916) 273-1500.

Sincerely,
RMC Water and Environment

REGISTERED PROFESSIONAL ENGINEER
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Innovative Solutions for Water and the Environment

City of Lodi
2005 Urban Water Management Plan

Draft Report

Prepared by:

RMC
Water and Environment

February 3, 2006

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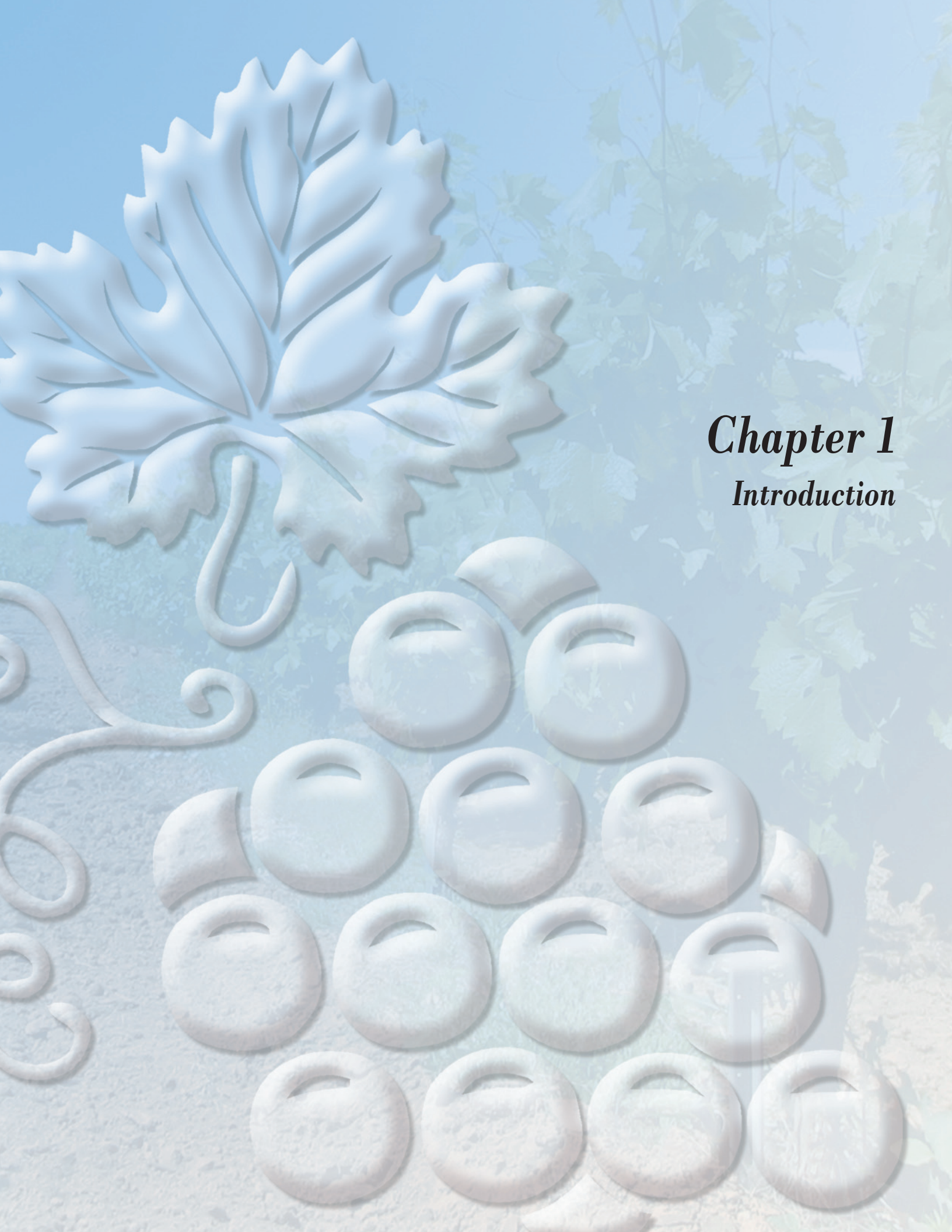
Acknowledgements

This 2005 Urban Water Management Plan Update represents a collaborative effort between RMC, the City of Lodi, and the Department of Water Resources. We would like to take an opportunity to thank the following key individuals:

Richard Prima, Jr.	Public Works Director, City of Lodi
Charles Swimley, Jr.	Senior Civil Engineer, City of Lodi
Wally Sandelin	City Engineer, City of Lodi
Frank Beeler	Assistant Water/Wastewater Superintendent
Del Kerlin	Assistant Wastewater Treatment Superintendent

List of Abbreviations

AB	Assembly Bill
Act	Urban Water Management Planning Act
AF	acre-feet
AFY	acre-feet annually or acre-feet per year
B/C	benefit to cost
BMP	best management practice
City	City of Lodi
CUWCC	California Urban Water Conservation Council
DBCP	dibromochloropropane
DHS	California Department of Health Services
DMM	demand management measure
DWR	California Department of Water Resources
EBMUD	East Bay Municipal Utility District
EPA	United States Environmental Protection Agency
ET_o	reference evapotranspiration
GAC	granular activated carbon
GBA	Northeastern San Joaquin County Groundwater Banking Authority
gpm	gallons per minute
gpcd	gallons per capita per day
gpd	gallons per day
Guidebook	"Guidebook to Assist Water Suppliers in the Preparation of a 2005 Urban Water Management Plan"
mgd	million gallons per day
MG	million gallons
MOU	Memorandum of Understanding
MSL	mean sea level
RWMP	Recycled Water Master Plan
SB	Senate Bill
TDS	total dissolved solids
USGS	United States Geological Survey
UV	ultraviolet
UWMP	Urban Water Management Plan
WID	Woodbridge Irrigation District
WSWPCF	White Slough Water Pollution Control Facility



Chapter 1

Introduction

Chapter 1 Introduction

This 2005 City of Lodi Urban Water Management Plan (UWMP) was prepared in compliance with the Urban Water Management Planning Act, as amended. It includes all information necessary to meet the requirements of California Water Code, Division 6, Part 2.6.

1.1 Background

1.1.1 Urban Water Management Act

The Urban Water Management Act (Act) was created by Assembly Bill 797 (AB 797) which was signed into law by Governor Deukmejian on September 21, 1983. The Act requires that urban water suppliers (i.e. municipal water suppliers providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 AF annually) prepare and adopt Urban Water Management Plans containing certain specified elements.

The Act was amended by Assembly Bill 2661 (AB 2661), which was signed into law by Governor Deukmejian on July 18, 1990. AB 2661 deleted the January 1, 1991 termination date specified in AB 797. AB 2661 also expanded the elements which are to be addressed in Urban Water Management Plans.

The Act was also amended by Assembly Bill 1869 (AB 1869), which was signed by Governor Wilson on October 13, 1991. AB 1869 requires that urban water suppliers update (not just review) Urban Water Management Plans every five years to include projections of both potable and recycled water use, identify current reclamation practices, address additional alternative conservation measures, and describe findings, actions, and planning related to a number of water conservation and reclamation measures.

The Act was further amended by Assembly Bill 11X (AB 11X) signed by Governor Wilson on October 13, 1991. AB 11X requires that urban water suppliers prepare an Urban Water Shortage Contingency Plan as an amendment to its Urban Water Management Plan. Water Shortage Contingency Plans must be updated every five years and specify proposed measures for response to short and long term water shortages.

1.1.2 Purpose of Plan Preparation

The City of Lodi (City) has prepared this UWMP to ensure the efficient use of available water supplies, describe and evaluate the existing water system and historical and projected water use, evaluate current and projected water supply reliability, describe and evaluate demand management measures, and provide water shortage contingency plans as required by the UWMP Act.

By preparing this UWMP, the City continues its commitment to intelligent planning and management of its water supplies. With this document, the City meets the UWMP requirement for funding under the Proposition 50, Chapter 8 Integrated Regional Water Management Plan Grant Program. Data from the UWMP can also be linked to California Water Plan Updates. Additionally, a complete UWMP serves as a foundational document for Water Supply Assessments (SB 610) and Written Verification of Water Supply (SB 221) requirements.

1.1.3 Resource Maximization/Input Minimization

The City of Lodi understands that water is a limited, though renewable resource, and that a long-term reliable supply of water is essential to protect the local and state economy. It also recognizes

that, while conservation and efficient use of water is a statewide concern, planning for this use is best done at the local level.

The main focuses for the City are to 1) maximize the efficient use of water and install water meters, 2) develop and implement a Recycled Water Master Plan (RWMP), and 3) develop the necessary infrastructure to utilize surface water. In addition, the City is increasing its other water conservation measures as described later in the UWMP.

1.2 Agency Coordination

1.2.1 Plan Preparation Coordination

The City is a member of the Northeastern San Joaquin County Groundwater Banking Authority (GBA). Through involvement in GBA, the City works together with a number of water agencies in the surrounding area to develop solutions for groundwater management. The City coordinated the preparation of this UWMP with GBA through notification of the UWMP update process and by providing a copy of the Draft 2005 UWMP for review. GBA was also sent a notice of intention to adopt, a copy of which is included in **Appendix B**.

By coordinating with neighboring water agencies through GBA, the City will ensure that its groundwater supply needs, as outlined in this UWMP, will be incorporated into regional groundwater management efforts.

1.3 Plan Updates

This 2005 UWMP serves as an update to the City's 2000 UWMP. The City's UWMP was first developed in 1990, and addressed water supply and demand for the City. The 1990 Plan and 1995 Plan update were prepared by the City. The 1995 Plan update included a description of the water system, historical and projected water use, water supply alternatives, recycled water use, water conservation programs, and a water shortage contingency plan. The 2000 Plan update (prepared by Brown and Caldwell) added discussions of water supply constraints, detailed economic analyses of the City's best management practices for water conservation, and descriptions of the City's wastewater system.

1.4 City and County Notification and Participation

San Joaquin County was sent a copy of the UWMP and a notice of intention to adopt.

1.5 Public Participation

The City encouraged public participation in the development of the 2005 UWMP and provided opportunities for public review and comment. On February 15, 2006, the City placed a Notice of Intention to Adopt on its website stating that its UWMP was being updated and that a public review period would be provided to address comments and concerns from members of the community. The notice stated that the public review period would be scheduled from February 15 through March 1, 2006. A copy of this Notice of Intention to Adopt is included in **Appendix B**. The notice, as well as the Draft 2005 UWMP, was made available for public inspection on the City's website. On February 15, 2006, the City conducted a public hearing to hear comments from the public regarding the UWMP. This hearing provided an opportunity for the City's customers/residents and employees in the area to learn about the water supply situation and the plans for providing a reliable, safe, high-quality water supply for the future. Information regarding the public hearing and the public review period is included in **Appendix B**. This UWMP was finalized after the public review period and was placed on the City's website.

1.6 Plan Adoption

The City prepared this 2005 UWMP Update during the fall and winter of 2005. The plan was adopted by its City Council on February 15, 2006 and was submitted to the California Department of Water Resources within 30 days of the council approval. See **Appendix A** for a copy of the resolution. The UWMP was also sent to the California State Library.

1.7 Other Agencies

Upon completion, this UWMP was submitted to the following agencies not listed above:

- California Department of Health Services
- Lodi Public Library

Chapter 2

Supplier Service Area

Chapter 2 Supplier Service Area

2.1 Service Area Description

The City is located in the Northern San Joaquin Valley in San Joaquin County and borders the Mokelumne River. The bulk of the City's geographical area extends from the Mokelumne River on the north, WID South Main Canal and Lower Sacramento Road on the west, Harney Lane on the south, and portions of Highway 99 and Central California Traction (CCT) Railroad on the east. The City's White Slough Water Pollution Control Facility (WSWPCF) lies approximately six miles to the southwest of the City. The City has an estimated 2005 population of 62,467 (California Department of Finance, 2005).

The City of Lodi Water Utility (Utility) is the sole water purveyor for the City of Lodi. The Utility's service area is contiguous with the City boundaries and covers approximately 12 square miles. There are a few minor connections outside the City. The service area includes a mix of residential, commercial, and industrial land use, and is characterized by essentially flat terrain. All future development being considered for the City is expected to occur within the present service area.

2.2 Climate

The City has cool, humid winters, and hot, dry summers. Temperatures average 60°F annually, ranging from average winter morning lows in the upper 30's to average summer afternoon highs in the upper 80's (Western Regional Climate Center, 2005). Relative humidity ranges from 91 percent in winter months to 26 percent in summer months. During summer months, temperatures may exceed 100 ˚F, impacting water demands significantly. Annual rainfall averages approximately 18 inches, with most rainfall occurring between November and April. The combination of warmer temperatures and low precipitation during the summer results in peak water demands during that period. Reference evapotranspiration (ET_o) values, which serve as indicators of how much water is required to maintain healthy agriculture and landscaping, range from 0.93 inches during December to 8.06 inches in July. Temperature, rainfall and evapotranspiration averages for the City are presented in **Table 2-1**.

Table 2-1: Service Area Climate (Guidebook Table 3)[a]

Month	January	February	March	April	May	June
Average ET_o[b] (in)	1.24	1.96	3.41	5.10	6.82	7.80
Average Rainfall[c] (in)	3.47	2.95	2.60	1.35	0.49	0.13
Average Temperature[c] (F)	45.65	50.40	54.15	58.90	64.90	70.30

(continued on next page)

Table 2-1 (Continued)

Month	July	August	September	October	November	December	Annual
Average ET_o (in)	8.06	7.13	5.40	3.72	1.80	0.93	***54.30***
Average Rainfall (in)	0.04	0.05	0.30	0.93	2.29	3.03	***17.63***
Average Temperature (°F)	73.70	72.70	69.95	62.60	52.55	45.65	***60.12***

Footnotes:

a. The term "Guidebook X" refers to the table in the *Guidebook to Assist Water Suppliers in the Preparation of a 2005 Urban Water Management Plan* by DWR.
b. California Irrigation Management Information System (CIMIS).
c. Western Regional Climate Center.

2.3 Other Demographic Factors

Other demographic factors affecting the City's water supply management planning include data on the largest customers, including those listed in Table 2-2 below.

Table 2-2: Large Water Customers

Customer	2004 Water Use, MG	% of Total System
Lodi Unified School District	150,703,608	2.7
Pacific Coast Producers	130,632,769	2.4
City of Lodi (incl. parks)	113,024,617	2.0
General Mills	69,261,284	1.2
Cottage Bakery	35,077,460	0.6
Lodi Memorial Hospital	28,502,316	0.5
Certainteed	7,763,492	0.1
Valley Industries	8,334,291	0.2
Wine & Roses	8,371,534	0.2
Miller Packing Co.	8,442,676	0.2
Total	***560,114,047***	***10.1%***

2.4 Population Projections

Currently, the City's population is approximately 62,467. Based on the City's assumed annual population growth rate of 1.5 percent, which was presented in the Lodi Wastewater Master Plan (West Yost & Associates, 2001) and reaffirmed during discussions with City staff, population in 2030 is expected to be approximately 90,636. Population projections from 2005 to 2030 are presented in **Table 2-3** below. In addition, Table 2-3 presents population projections based on population growth rates of 1 percent and 2 percent; the population projections for these growth rates are provided for comparative purposes only.

Table 2-3: Current and Projected Population (Guidebook Table 2)

Population Growth Rate [b]	Service Area Population					
	2005 [a]	2010	2015	2020	2025	2030
1.00%	62,467	65,653	69,002	72,522	76,222	80,110
1.50%	***62,467***	***67,295***	***72,496***	***78,098***	***84,134***	***90,636***
2.00%	62,467	68,969	76,147	84,072	92,823	102,484

Footnotes:

a. California Department of Finance (DoF).

b. For the purposes of this UWMP, the City has assumed an annual population growth rate of 1.5 percent, used in previous reports (e.g., Wastewater Master Plan) for facilities planning. Growth rates of 1 and 2 percent are shown here for comparative purposes only.

As an additional comparison, the City's existing (1991) General Plan estimated the City's population for 2007 at 71,944 (not including the Planned Residential Reserve area), and 96,589 (including the Planned Residential Reserve area). The higher population estimates presented in the existing General Plan reflect a 1987-2007 growth rate of 2.0 percent.

Chapter 3

Water Supply

Chapter 3 Water Supply

3.1 Current Water Supply

3.1.1 Background

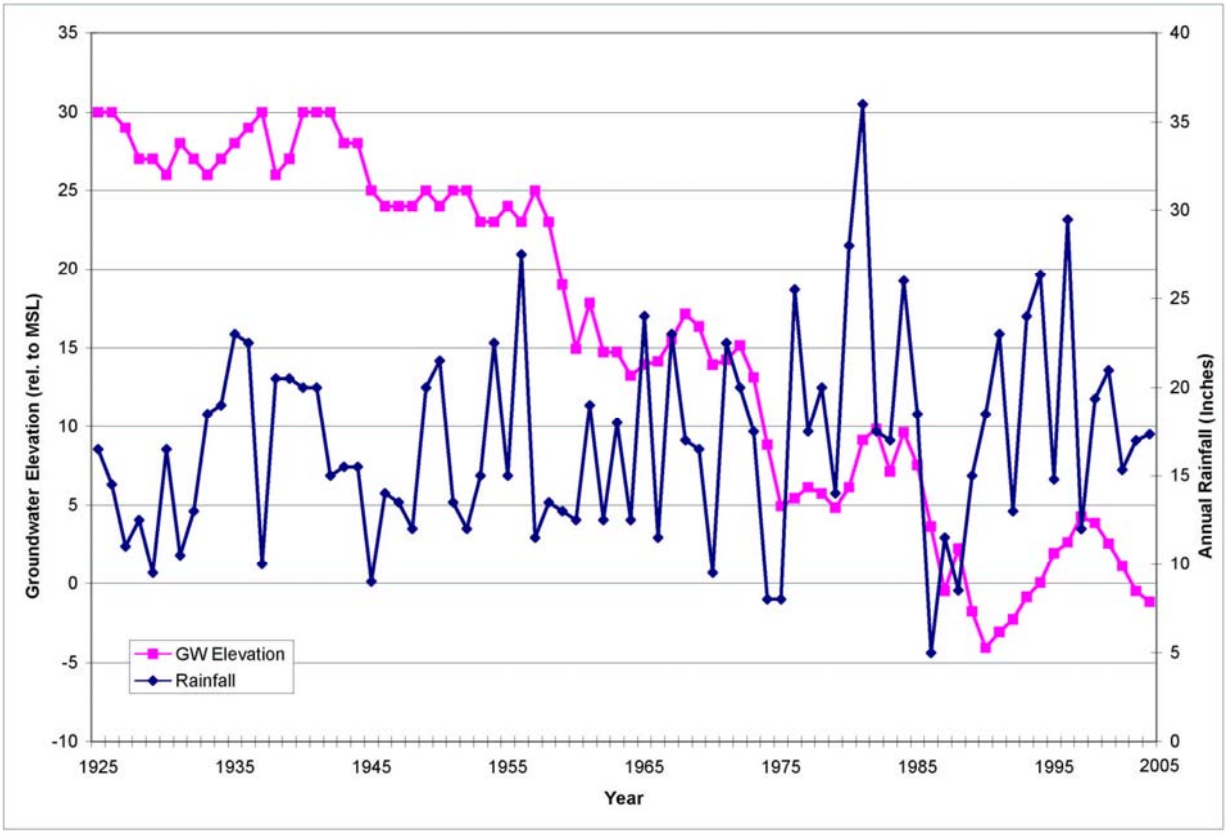
The City currently uses groundwater as its sole source of supply. The City overlies a portion of the San Joaquin Valley groundwater basin, which is not currently adjudicated. The groundwater in the Lodi area exists under unconfined and semi-confined conditions. The Mehrten Formation is the most productive fresh water-bearing unit.

The City is located within the geomorphic province known as the Central Valley, which is divided into the Sacramento Valley and the San Joaquin Valley. The Central Valley is a large, northwestward-trending, asymmetric structural trough that has been filled with several miles of thick sediment (USGS 1986). The City lies within the San Joaquin Hydrologic Basin (DWR, Bulletin 118) which straddles portions of both the Sacramento and San Joaquin Valleys. Sediments of the San Joaquin Valley consist of interlayered gravel, sand, silt, and clay derived from the adjacent mountains and deposited in alluvial-fax, floodplain, flood-basin, lacustrine, and marsh environments. Hydrogeologic units in the San Joaquin Basin include both consolidated rocks and unconsolidated deposits. The consolidated rocks include 1) the Victor Formation, 2) the Laguna Formation, and 3) the Mehrten Formation. The consolidated rocks generally yield small quantities of water to wells except for the Mehrten Formation, which is an important aquifer (DWR). The unconsolidated deposits include) continental deposits, 2) lacustrine and marsh deposits), 3) older alluvium, 4) younger alluvium, and 5) flood-basin deposits. The continental deposits and older alluvium are the main water-yielding units in the unconsolidated deposits.

Groundwater flow direction is generally toward the south in agreement with the regional groundwater flow gradient buy may vary from south-southwest to south-southeast with local gradients likely influenced by pumping form municipal supply wells. Pumping tests on municipal wells indicate that they possess a large capture zone, and thus have a large influence upon groundwater flow. Pumping of municipal supply wells in the City is performed between 100 and 500 feet below ground surface (Geomatrix, 2006).

DWR has declared that the groundwater basin underlying Eastern San Joaquin County is overdrafted, and groundwater levels in the County and the City are generally decreasing. The groundwater levels also fluctuate over time depending on precipitation, aquifer recharge, and pumping demands. Groundwater elevations relative to mean sea level (MSL), and the corresponding annual precipitation from 1927 through 2004 are shown in **Figure 3-1**. Overall, the average annual decrease in groundwater levels from 1927 to 2004 has been 0.39 feet per year. Generally, groundwater elevations have decreased with the increase in population and water production. However, annual rainfall also influences groundwater elevation. The groundwater level increase from 1981 to 1984 can be partially attributed to the increase in annual rainfall from 1981 to 1983. Groundwater elevations for the years 1927 to 1961 were obtained from East Bay Municipal Utilities District (EBMUD) for the City's 12 square mile area. Groundwater elevation data from 1962 to the present were obtained from the City's Public Works Department for Well No. 2, one of the oldest production wells in the City.

Figure 3-1: Historical Groundwater Elevation

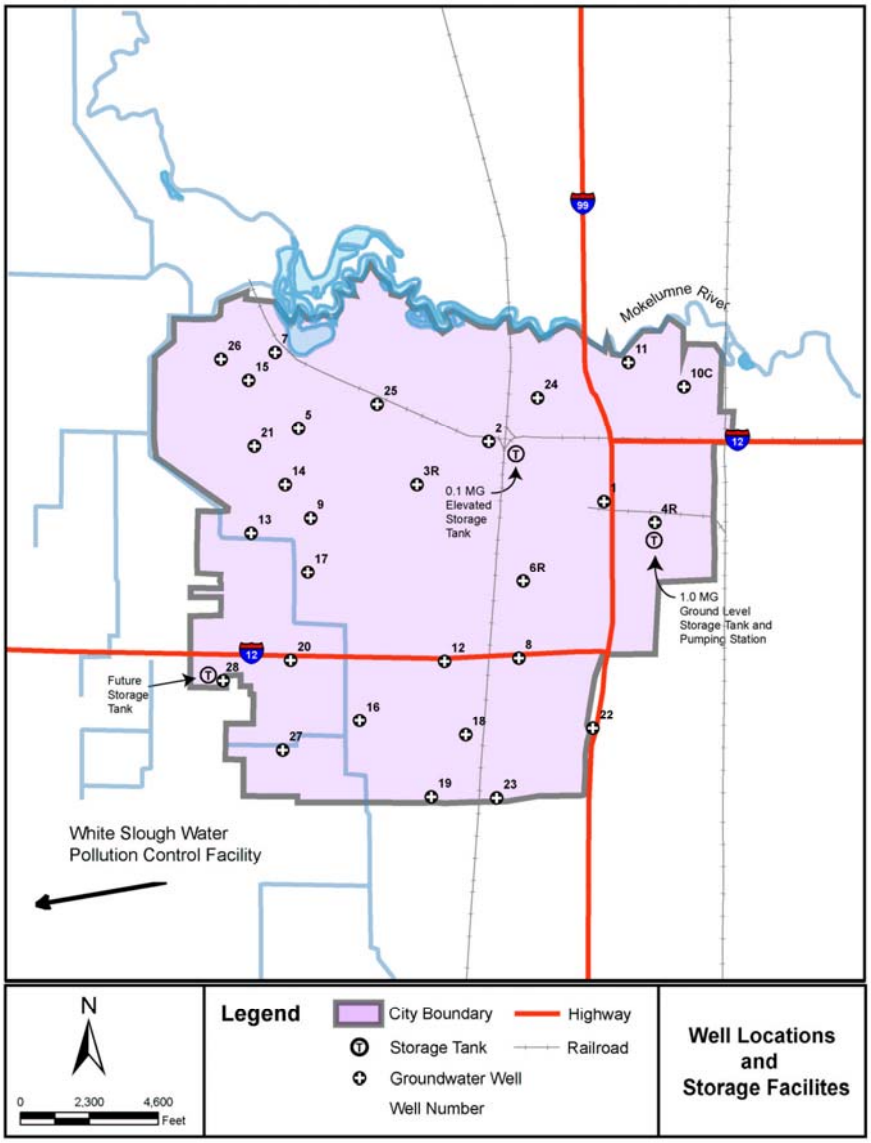


Source: City of Lodi Public Works Department

3.1.2 Water Supply Facilities

The Utility operates 26 groundwater production wells. The locations of the wells are presented in **Figure 3-2** and discussed in further detail below.

Figure 3-2: Well Locations and Storage Facilities



3.1.3 Current Groundwater Supply

The 26 wells that currently provide water to the City have a combined capacity of 35,210 gallons per minute (gpm), or 50.7 million gallons per day (mgd). The wells operate automatically on water pressure demand and pump directly into the distribution system. All wells are equipped to provide emergency chlorination as needed. Historically, water has not required chlorination. Six wells are equipped with granular activated carbon (GAC) for the removal of dibromochloropropane (DBCP). Capacity information for the existing wells is summarized in **Table 3-1**.

Table 3-1: Groundwater Well Capacity

Well Number	Well Capacity, gpm[b]	Well Capacity, mgd[c]
1R	1,130	1.6
2	820	1.2
3R	820	1.2
4R[a]	1,960	2.8
5	1,180	1.7
6R	1,580	2.3
7	1,160	1.7
8	800	1.2
9	900	1.3
10C	1,300	1.9
11R	1,320	1.9
12	800	1.2
13	1,150	1.7
14	1,670	2.4
15	1,500	2.2
16[a]	1,110	1.6
17	1,800	2.6
18[a]	1,800	2.6
19	1,110	1.6
20[a]	2,070	3.0
21	2,050	3.0
22[a]	1,400	2.0
23[a]	1,410	2.0
24	1,420	2.0
25	1,580	2.3
26	1,370	2.0
Total	**35,210**	**50.7**

Footnotes:
a. Wells equipped with GAC
b. gpm = gallons per minute
c. mgd = million gallons per day

Table 3-2 presents the amounts of groundwater extracted by the City between 1970 and 2004.

Table 3-2: Historical Groundwater Production (Guidebook Table 5)[a]

Year	Groundwater Production, AF	Percent of Total Water Supply
1970	11,462	100%
1971	12,303	100%
1972	11,686	100%
1973	12,204	100%
1974	12,002	100%
1975	12,294	100%
1976	13,607	100%
1977	10,578	100%
1978	11,477	100%
1979	12,349	100%
1980	12,312	100%
1981	12,487	100%
1982	11,560	100%
1983	11,539	100%
1984	13,997	100%
1985	14,813	100%
1986	15,080	100%
1987	15,304	100%
1988	15,359	100%
1989	14,653	100%
1990	15,387	100%
1991	13,313	100%
1992	13,985	100%
1993	14,013	100%
1994	14,301	100%
1995	14,390	100%
1996	15,102	100%
1997	16,330	100%
1998	14,461	100%
1999	16,588	100%
2000	16,724	100%
2001	17,108	100%
2002	16,641	100%
2003	16,185	100%
2004	17,011	100%

Footnotes:

a. The term "Guidebook X" refers to the table in the *Guidebook to Assist Water Suppliers in the Preparation of a 2005 Urban Water Management Plan* by DWR.

3.1.4 Current Surface Water Supply

In May 2003, the City entered into an agreement with Woodbridge Irrigation District (WID) to purchase 6,000 acre-feet per year (AFY) of surface water for a period of 40 years. However, at the time this UWMP was prepared, the City had not yet begun using water from this supply. A copy of the City's agreement with WID is included in **Appendix D**.

3.1.5 Current Recycled Water Supply

The City's wastewater discharge permit requires an agronomic application rate. According to discussions with City staff, approximately 2,500 AFY of secondary treated recycled water is currently used, primarily for irrigation in the area surrounding WSWPCF. This represents approximately 35 percent of the total treated wastewater produced at WSWPCF. The City discharges the non-irrigation water, treated to Title 22 tertiary standards, to the Delta. The Utility currently lacks the necessary infrastructure to distribute additional recycled water to more of its customers.

For a more detailed discussion of the City's recycled water supply, as well as the processes by which it is treated, refer to Chapter 8.

3.1.6 Water Distribution System

The City of Lodi's distribution system consists of a 100,000 gallon elevated storage tank, a 1 million gallon (MG) storage facility and pumping station, and the piping system. The 1 MG storage tank, located east of Highway 99 on Thurman Street, stores groundwater from an onsite well to meet peak hour demands and fire flows. The 100,000 gallon elevated storage tank is located on North Main Street. The storage facilities and their capacities are presented in Table 3-3. Their locations are shown in Figure 3-2.

Table 3-3: Water Storage Facilities

Storage Facility	Storage Volume, MG
Elevated storage tank	0.10
Ground level storage tank	1.00
Total	***1.10***

Distribution mains in the City's piping system range from 14 inches to 2 inches in diameter, and the entire distribution system consists of approximately 225 miles of pipe. The City is in the process of replacing the 2-inch and 3-inch diameter mains as well as other deficient pipes.

A summary of the City's current and planned water supplies is presented in **Table 3-5**.

3.2 Future Water Supply

3.2.1 Constraints on Existing Supplies

The City's current water supply system is constrained by 1) the pumping capacity of its currently active wells, and 2) a longer-term reduction in supply due to the overdrafting currently taking place in the City's groundwater basin. Although the declining groundwater basin is a result of groundwater extraction by all groundwater pumpers in the area, including other cities, agriculture, private well owners, and the City itself, the City plans to reduce its groundwater pumping in the long term as part of what will have to be a regional effort to stabilize the groundwater basin. A copy of the GBA Groundwater Management Plan is included in **Appendix F**.

3.2.2 Future Groundwater Supply

The continuing decline of groundwater levels in the aquifer underlying the City means that the sustainable annual groundwater supply available to the City is something less than what is currently extracted. As a member agency of GBA, the City is participating in the development of policies and programs, including groundwater recharge and conjunctive use programs, intended to help eliminate the eastern San Joaquin County groundwater basin overdraft condition. Additionally, the City plans to reduce its overall groundwater pumping in the future. A safe yield of approximately 15,000 AFY (Treadwell and Rollo, 2005) has been estimated for the aquifer serving Lodi based on water balance calculations (see **Appendix G**) performed using data primarily from the Eastern San Joaquin Groundwater Management Plan (**Appendix F**). This safe yield estimate reflects an acreage-based relationship. For the purposes of this UWMP, 15,000 AFY has therefore been assumed as the amount of groundwater available during all future (post-2005) years. Although rigorous scientific analyses have not been performed, the City projects that some recharge of the groundwater basin will occur as the amount of groundwater pumped annually decreases. This result, however, is contingent on the cooperative efforts of all groundwater users within the basin, including other cities, agriculture, and private well owners, to reduce groundwater extraction. The City does not expect development of cones of depression, significant changes in direction or amount of groundwater flow, changes in the movement or levels of contaminants, or changes in salinity and/or total dissolved solids (TDS) concentrations. The amount of groundwater that is projected to be pumped over the next twenty-five years is presented in **Table 3-4**.

Table 3-4: Projected Groundwater Pumping (Guidebook Table 7)

Year	2005	2010	2015	2020	2025	2030
Annual Volume, AF	17,300	15,000	15,000	15,000	15,000	15,000
Percent of Total Available Supply [a]	57%	52%	51%	50%	49%	48%

Footnote:

a. Refers to the total supplies shown in Table 3-5.

3.2.3 Future Surface Water Supply

As discussed in Section 3.1.4, in May 2003 the City entered into a 40-year agreement with WID for 6,000 AFY of surface water from the Mokelumne River. The diversion point has not yet been determined. The City plans to build the necessary infrastructure to treat and deliver drinking water from this source before 2010. Therefore, 6,000 AFY of treated surface water is included in the supply projections presented in Table 3-5 below. The City is also considering the possibility of obtaining additional surface water supplies from WID; these supplies are not included in Table 3-5, however, as they are not yet considered "firm" supplies.

3.2.4 Future Recycled Water Supply

As discussed in Section 3.1.5, the City currently treats approximately 7,200 AFY of wastewater at WSWPCF, of which 2,500 AFY is recycled in the vicinity of WSWPCF. WSWPCF has adequate capacity to treat all wastewater flows to Title 22 standards. The City is in the process of developing a Recycled Water Master Plan (RWMP) that will outline additional distribution of this supply to the Utility's customers. For the purposes of this UWMP, all treated wastewater produced at WSWPCF has been treated as recycled water supply and is included in Table 3-5 below. The amount of recycled water available increases with time, because as the City's population increases, the amount of wastewater available for reclamation will also increase. For a more detailed discussion of recycled water supply projections, refer to Section 8.6

Table 3-5: Current and Planned Water Supplies (Guidebook Table 4)

Water Supply Source	2005	2010	2015	2020	2025	2030
Groundwater [a], AFY	17,300	15,000	15,000	15,000	15,000	15,000
WID Surface Water, AFY	6,000	6,000	6,000	6,000	6,000	6,000
Recycled Water [b], AFY	7,200	7,700	8,300	8,940	9,630	10,380
Total [c], AFY	***30,500***	***28,700***	***29,300***	***29,900***	***30,600***	***31,400***

Footnotes:

a. Refer to Section 3.2.2 for more information.
b. Based on the amount of wastewater treated during 2004, according to City staff. Future recycled water supplies are extrapolated from the 2004 amount. Assumes that the permitted capacity of WSWPCF will be increased as necessary.
c. Rounded to nearest hundred.

3.2.5 Planned Water Supply Projects

At the present time the City does not have approved plans for any additional water supply projects. The City has participated in the Mokelumne River Regional Water Storage and Conjunctive Use (MORE WATER) Feasibility Analysis. The MORE WATER project, if approved, would capture unappropriated flows from the Mokelumne River for storage and beneficial use.

3.3 Exchange or Transfer Opportunities

The City does not currently have any approved plans to pursue exchange or transfer opportunities.

3.4 Desalinated Water

At the present time the City does not foresee any opportunities for the use of desalinated water, which includes ocean water, brackish ocean water, and brackish groundwater, as long-term supplies.

3.5 Wholesale Supplies

Since surface water will be purchased from WID, WID is considered a wholesale water supplier by DWR. As such, the City has provided demand projections to WID for the next 25 years. Similarly, the City has received availability projections from WID for the same time period. These demand and availability projections are presented in **Table 3-6** and **Table 3-7** below. As discussed previously, the City has not yet begun to use this water supply. As stated in the City's contract with WID, any water not taken by the City during the first three years of the contract (May 2003 to May 2006) may be "banked" and delivered to the City in subsequent years, provided WID has sufficient water available. The banked supply may not exceed 18,000 AF. To date, over 16,000 AF of water has been banked. The City has not made any formal plans at this time use any of its banked supply, in addition to the normal 6,000 AFY, for any of the years shown in the tables below. However, the projected supplies and demands shown below may increase if and when the City decides to use its banked supply. The magnitude and availability of banked supply to be delivered will be discussed with WID at an appropriate time(s) in the future.

Table 3-6: Demand Projections for Wholesale Supply

Wholesale Supply	Projected Demand [a]					
	2005	2010	2015	2020	2025	2030
WID Surface Water, AFY	0	6,000	6,000	6,000	6,000	6,000

Footnotes:

a. Subject to change with WID and City approval. Although the City may take water deliveries in excess of 6,000 AFY from its "banked" supply, no formal plans to do so have been developed at this time.

Table 3-7: Availability Projections from Wholesale Supplier

Wholesale Supply	Projected Availability [a]					
	2005	2010	2015	2020	2025	2030
WID Surface Water, AFY	6,000	6,000	6,000	6,000	6,000	6,000

Footnotes:

a. Subject to change with WID and City approval. Although the City may take water deliveries in excess of 6,000 AFY from its "banked" supply, no formal plans to do so have been developed at this time.

Chapter 4

Water Demand

Chapter 4 Water Demand

4.1 Past, Current, and Projected Water Demand

Water demand projections provide the basis for sizing and staging future water supply facilities. Water use and production records, combined with projections of population and urban development, provide the basis for estimating future water requirements. This chapter presents a summary of available demographic and water use data and the resulting projections of future water needs for the City.

4.1.1 Past and Current Water Demand

Records of historical water production were obtained from the City's Public Works Department. These data include both maximum day and annual water production. Water production is the volume of water measured at the source, which includes all water delivered to residential, commercial, and public authority connections, as well as unaccounted-for water.

Annual Water Production

Groundwater production from 1970 to 2004 is presented in Table 3-2. Total water production in 2004 was 17,011 acre-feet (AF). Water use by customer class can only be estimated, as most of the Utility's customers are not currently metered.

Maximum Day Demand

Daily demand fluctuates throughout the year, due primarily to seasonal climate changes. Water demands are significantly higher in the summer than the winter. System production facilities must be sized to meet the demand on the maximum day of the year, not just the average. Water systems are sized to meet the greater of 1) the maximum day demands plus fire flow, or 2) peak hour demand. Fire flow and peak hour demand are not addressed in this UWMP.

The average day and maximum day demands for years 1977 through 2004 are presented in **Table 4-1**. The maximum day demand in 2004 was 19,014 gpm, in comparison with the total well production capacity of 35,210 gpm. The ratio between average and maximum day demands provides a maximum day peaking factor that can be used to scale annual demand projections to maximum day levels. The average maximum day peaking factor from 1995 to 2004 is 1.91.

Table 4-1: Maximum Day Demand and Peaking Factors

Annual average				Maximum day		
Year	AFY	mgd	gpm	mgd	gpm	Peaking factor[b]
1977	10,578	9.44	6,556	19.28	13,389	**2.04**
1978	11,478	10.25	7,118	--[a]	--	**--[a]**
1979	12,349	11.02	7,653	22.50	15,625	**2.04**
1980	12,312	10.99	7,632	24.00	16,667	**2.18**
1981	12,487	11.15	7,743	22.34	15,514	**2.00**
1982	11,560	10.32	7,167	21.30	14,792	**2.06**
1983	11,539	10.30	7,153	21.67	15,049	**2.10**
1984	13,997	12.50	8,681	26.20	18,194	**2.10**
1985	14,814	13.22	9,181	--[a]	--	**--[a]**
1986	15,081	13.46	9,347	26.91	18,688	**2.00**
1987	15,305	13.66	9,486	27.00	18,750	**1.98**
1988	15,360	13.71	9,521	28.40	19,722	**2.07**
1989	14,654	13.08	9,083	28.50	19,792	**2.18**
1990	15,387	13.74	9,542	24.29	16,868	**1.77**
1991	13,313	11.88	8,250	21.55	14,965	**1.81**
1992	13,985	12.48	8,667	24.00	16,667	**1.92**
1993	14,013	12.51	8,688	24.10	16,736	**1.93**
1994	14,301	12.77	8,868	22.94	15,931	**1.80**
1995	14,390	12.85	8,924	24.64	17,111	**1.92**
1996	15,102	13.48	9,361	27.93	19,396	**2.07**
1997	16,330	14.58	10,125	28.68	19,917	**1.97**
1998	14,461	12.91	8,965	29.66	20,597	**2.30**
1999	16,587	14.81	10,285	28.32	19,667	**1.91**
2000	16,724	14.93	10,368	29.48	20,472	**1.97**
2001	17,108	15.27	10,606	30.10	20,903	**1.97**
2002	16,641	14.86	10,317	28.70	19,931	**1.93**
2003	16,185	14.45	10,034	26.68	18,530	**1.85**
2004	17,011	15.19	10,546	27.38	19,014	**1.80**
Average 1977 – 2004		13.48	9,364	27.45	19,063	**1.93**
Average 1995 – 2004		14.94	10,374	28.62	19,873	**1.91**

Source: City of Lodi Public Works Department
Footnotes:
a. Data unavailable
b. Maximum day peaking factor = maximum day demand/annual average day demand

Unaccounted-for Water

Unaccounted-for water use is unmetered water use, such as water use for fire protection and training, system and hydrant flushing, sewer cleaning, system leaks, and unauthorized connections. Unaccounted-

for water can also result from meter inaccuracies. Since the City's system is not completely metered, data are unavailable for determining the percent of unaccounted-for water. Unaccounted-for water is generally assumed to equal approximately 10 percent of total water production.

Unit Water Use

Recent historical unit water use, expressed as gallons per capita per day (gpcd), is shown in **Table 4-2**. These unit demands include commercial usage, industrial usage, and unaccounted-for water.

Table 4-2: Recent Historical Unit Water Use

Year	Population	Unit Water Use [a], gpcd
1999	56,926	260
2000	57,763	258
2001	58,600	261
2002	59,431	250
2003	60,521	239
2004	61,325	248

Footnote:
a. Based on total municipal water production provided by City of Lodi staff.

4.1.2 Future Water Demand

Future water demands are estimated based on 1) a constant 1.5 percent annual increase in the City's demand, 2) a constant 1.5 percent annual increase in the number of service connections, 3) the assumption that the City will install and begin reading water meters at a rate of approximately 950 per year, starting in 2006 or 2007, and 4) the assumption that as existing service connections become metered they will exhibit slightly lower unit demand factors than existing service connections without meters. It has been assumed that a residential service connection will exhibit a demand reduction of approximately 15 percent[1] once billing has commenced at commodity rates. Demands were projected based on actual water use in 2004. These projections are shown in **Table 4-5** and illustrated in **Figure 4-1**. By 2030, average annual water demands[2] are expected to have increased from current demands by approximately 20 percent, from about 19,800 AFY (17.7 mgd) in 2005 to 23,800 AFY (21.2 mgd) in 2030. Demand projections by water use sector are presented in **Table 4-3.**

The projections in Table 4-5 represent normal (average) conditions, as actual use varies based on a number of factors. For this reason, it can be expected that there will be variations in the City's future water usage. The values predicted in these tables have been used in this UWMP, as they are assumed to represent average conditions of water demand.

[1] Based on 1) information from the California Urban Water Conservation Council (CUWCC), 2005, and 2) judgement of City of Lodi staff.
[2] Including 2,500 AFY currently being recycled in the vicinity of WSWPCF.

Table 4-3: Past, Current, and Projected Water Use by Customer Class (Guidebook Table 12)[a]

Year	Customer Class	Unmetered Connections[e]	Unmetered Deliveries[f,g], AFY	Metered Connections[e,h]	Metered Deliveries[c,f,g], AFY	Total Number of Connections	Total Municipal Deliveries[d], AFY
2001	SFR	15,410	10,071	0	0	15,410	10,071
	MFR	577	2,828	0	0	577	2,828
	Commercial/Institutional	310	569	950	1,744	1,260	2,313
	Industrial	0	0	53	1,632	53	1,632
	Landscape	8	73	21	191	29	264
	TOTAL [b]	**16,300**	**13,500**	**1,000**	**3,600**	**17,300**	**17,100**
2005	SFR	16,537	9,955	0	0	16,537	9,955
	MFR	639	2,882	0	0	639	2,882
	Commercial/Institutional	310	750	1,018	2,462	1,328	3,211
	Industrial	0	0	56	945	56	945
	Landscape	8	76	23	219	31	295
	TOTAL [b]	**17,500**	**13,700**	**1,100**	**3,600**	**18,600**	**17,300**
2010	SFR	13,205	7,949	4,610	2,775	17,815	10,725
	MFR	509	2,294	180	811	688	3,105
	Commercial/Institutional	249	602	1,182	2,858	1,431	3,459
	Industrial	0	0	60	1,018	60	1,018
	Landscape	0	-2	34	320	33	318
	TOTAL [b]	**14,000**	**10,800**	**6,100**	**7,800**	**20,000**	**18,600**
2015	SFR	8,730	5,255	10,462	6,298	19,192	11,554
	MFR	334	1,504	408	1,840	742	3,345
	Commercial/Institutional	159	384	1,382	3,343	1,541	3,727
	Industrial	0	0	65	1,094	65	1,094
	Landscape	0	0	36	345	36	345
	TOTAL [b]	**9,200**	**7,100**	**12,400**	**12,900**	**21,600**	**20,100**
2020	SFR	4,255	2,561	16,420	9,885	20,675	12,446
	MFR	158	715	640	2,888	799	3,603
	Commercial/Institutional	69	167	1,591	3,848	1,660	4,015
	Industrial	0	0	70	1,178	70	1,178
	Landscape	0	0	39	372	39	372
	TOTAL [b]	**4,500**	**3,400**	**18,800**	**18,200**	**23,200**	**21,600**

(continued on next page)

Table 4-3 (Continued)

Year	Customer Class	Unmetered Connections[e]	Unmetered Deliveries[f,g], AFY	Metered Connections[e,h]	Metered Deliveries[c,f,g], AFY	Total Number of Connections	Total Municipal Deliveries[d], AFY
2025	SFR	0	0	22,273	13,409	22,273	13,409
	MFR	0	0	861	3,884	861	3,884
	Commercial/Institutional	0	0	1,788	4,324	1,789	4,324
	Industrial	0	0	75	1,269	75	1,269
	Landscape	0	0	42	401	42	401
	TOTAL [b]	**0**	**0**	**25,000**	**23,300**	**25,000**	**23,300**
2030	SFR	0	0	23,994	14,445	23,994	14,445
	MFR	0	0	927	4,181	927	4,181
	Commercial/Institutional	0	0	1,927	4,659	1,927	4,659
	Industrial	0	0	81	1,371	81	1,371
	Landscape	0	0	45	428	45	428
	TOTAL [b]	**0**	**0**	**27,000**	**25,100**	**27,000**	**25,100**

Footnotes:

a. The term "Guidebook X" refers to the table in the *Guidebook to Assist Water Suppliers in the Preparation of a 2005 Urban Water Management Plan* by DWR.
b. Rounded to the nearest hundred.
c. Does not reflect demand reductions as a result of meter implementation. Refer to **Table 4-5** for water savings as a result of meter implementation.
d. Does not include 2,500 AFY currently being recycled in the vicinity of WSWPCF.
e. Assumes 10 dwelling units per MFR connection.
f. Assumes 75% of total water deliveries go to SFR and MFR connections. This assumption is based on recent water usage statistics for the City, and is consistent with historical per capita water usage.
g. Assumes that the per-dwelling-unit demand factor for MFR connections is 75% of the unit demand factor for SFR connections.
h. Assumes that approximately 950 existing connections are retrofitted with meters every year between 2006 and 2025. The actual rate at which meters are installed/retrofitted may be greater.

4.2 Sales to Other Agencies

At the present time, the City does not foresee any opportunities for sales to other agencies.

4.3 Other Demands

Other water uses and losses in the City's service area are presented in **Table 4-4** below. The 2,500 AFY shown for recycled water includes the amount of water currently used to irrigate land in the vicinity of WSWPCF. Although the land is irrigated with non-potable secondary treated wastewater, the 2,500 AFY must be subtracted from the total amount of wastewater available to the City for reclamation and reuse in municipal applications. For the purposes of this UWMP, therefore, the 2,500 AFY is considered a demand.

Table 4-4: Additional Water Uses and Losses (Guidebook Table 14)

Water Use	2000	2005	2010	2015	2020	2025	2030
Recycled Water [a]	2,500	2,500	2,500	2,500	2,500	2,500	2,500
Unaccounted-for system losses [b]	1,672	1,727	1,774	1,801	1,837	1,883	2,029
Total	***4,172***	***4,227***	***4,274***	***4,301***	***4,337***	***4,383***	***4,529***

Footnotes:

a. Reflects the amount of recycled water currently recycled in the vicinity of WSWPCF. Does not include 1 mgd promised by the City in a "will serve" letter to Northern California Power Agency, as the power plant that would utilize this water is only *potential* at this time.

b. Unaccounted-for system losses are generally assumed to be approximately 10 percent of total water production. Because water usage is measured at the City's wells, unaccounted-for water is "accounted for" in the City's total demand projections in Table 4-5 (i.e., it *should not be added* to the demands in Table 4-5).

4.4 Total Demands

The City's total average annual demands are presented in **Table 4-5** and **Figure 4-1**. For the purposes of this UWMP, only the projected future demands *with* conservation are considered in subsequent analyses. It should be noted that while Table 4-3 includes projections for municipal demands only, Table 4-5 includes a demand of 2,500 AFY for non-municipal recycling (refer to previous section).

Table 4-5: Total Demands (Guidebook Table 15)

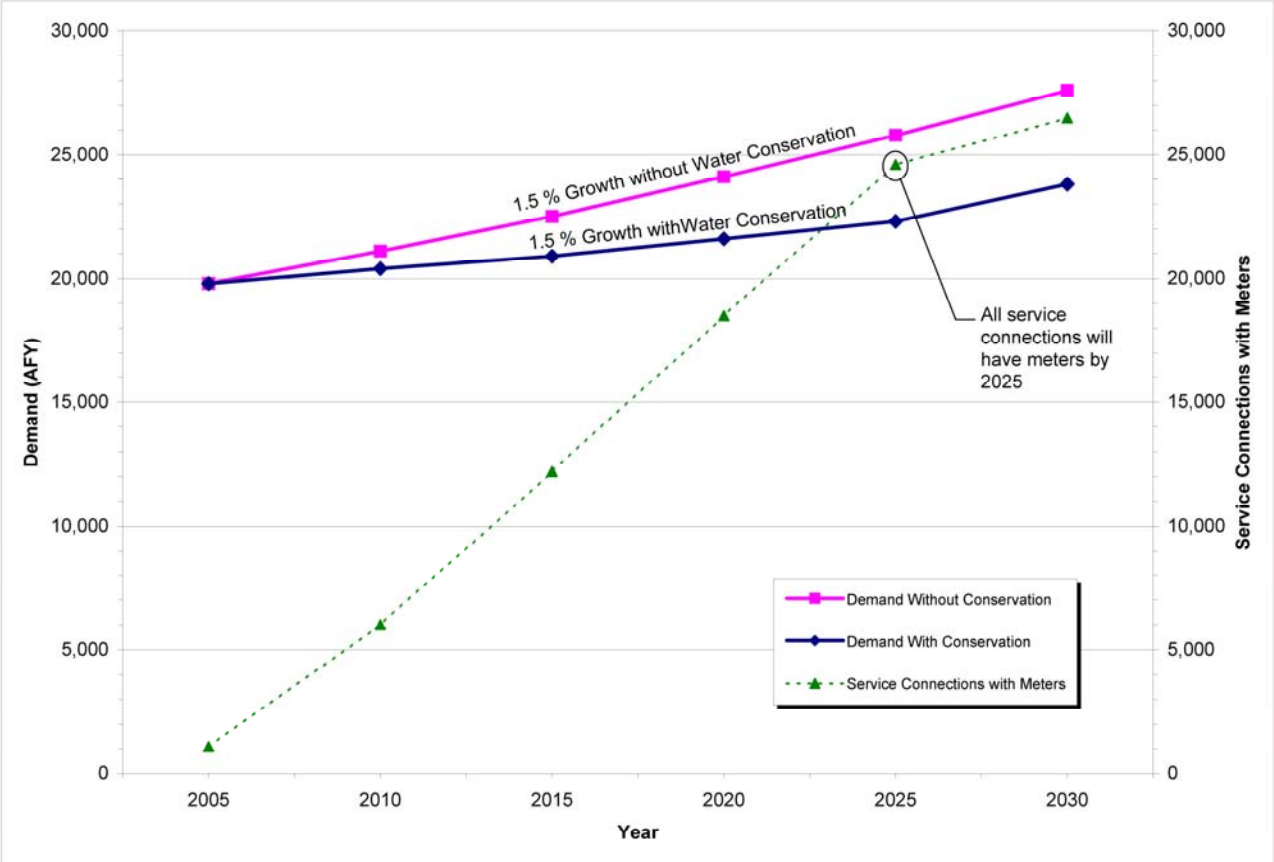
Year		2005	2010	2015	2020	2025	2030
Demand (AFY)	Without Conservation [a]	19,800	21,100	22,500	24,100	25,800	27,600
	With Conservation [a,b]	***19,800***	***20,400***	***20,900***	***21,600***	***22,300***	***23,800***

Footnotes:

a. Includes 2,500 AFY of recycled water currently recycled in the vicinity of WSWPCF. Table 4-3 includes municipal demands only, and therefore does not match this table.

b. Assumes a 15 percent reduction in demand for metered residential service connections.

Figure 4-1: Projected Water Demand



Chapter 5

Demand Management Measures

Chapter 5 Demand Management and Conservation

This chapter presents a detailed analysis of the Demand Management Measures (DMMs) contained in the UWMP Act, as well as the City's existing efforts to further develop its water conservation program. A DMM, also known as a Best Management Practice, is a program designed to maximize the efficient use of water and minimize water waste. The description, effectiveness, implementation schedule, costs, and methods of improvement for each of the DMMs has been included.

LAW

10631 (f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) A description of each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures..

(2) A schedule of implementation for all demand management measures proposed or described in the plan.

(3) A description of the methods, if any, that the supplier will use to evaluate the effectiveness of water demand management measures implemented or described under the plan.

(4) An estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of such savings on the supplier's ability to further reduce demand.

Introduction

The California Urban Water Conservation Council (CUWCC) was created to increase efficient water use statewide. CUWCC's goal is to integrate urban water conservation best management practices (BMPs) into the planning and management of California's water resources. A Memorandum of Understanding Regarding Urban Water Conservation in California (MOU) was developed and has been signed by over 150 water suppliers and other concerned parties. The MOU includes definitions, implementation, requirements, and water savings assumptions for each of 14 Best Management Practices. As part of the evaluation, the recommendations by the CUWCC were used to evaluate each DMM.

The City is not currently a signatory of the MOU.

OVERVIEW

Water conservation in Lodi is supported by the City Council and Lodi's citizens. The current program consists mainly of outdoor watering restrictions enforced by water conservation patrol staff, public education, and an in-school education program.

The City has had an enforced ordinance for water conservation continuously since 1977 and it has developed into one of the most comprehensive on-going programs functioning in the San Joaquin Valley. A copy of the conservation ordinance information sheet, as well as the City's Water Conservation Ordinance, is included in **Appendix C** in English and Spanish. The program consists mainly of outdoor watering restrictions enforced by water conservation patrol officers, public education, and an in-school education program. From 1977 through 1988, a single water conservation officer patrolled during the

months of May through October. Since 1989, three to four water conservation officers have patrolled from May through October to intensify and enhance the program.

The City is committed to water conservation and has implemented several additional policies and on-going programs that promote and encourage water conservation. In addition, the City has several drought-specific programs that can be implemented if water supplies become limited and the need for more intensive water conservation becomes necessary.

Table 5-1 provides an overview of the City's current water conservation policies and programs as they relate to the fourteen DMMs included in the UWMP Act. Detailed descriptions of the City's policies and programs follow. Benefit-to-cost (B/C) ratios are provided for each DMM that is not currently being implemented. B/C ratios of less than one are not considered to be financially beneficial, and are not recommended for implementation.

Table 5-1: Water Conservation Policy Overview

DMM	Demand Management Measure Description	City Conservation Program	Compliance with UWMP Act
1	Water Survey Programs for Single Family and Multi-Family Residential Customers	None at this time	B/C Ratio = 0.9
2	Residential Plumbing Retrofit	Rebates offered at the time of purchase for water saving devices	Yes
3	System Water Audits, Leak Detection and Repair	Goal to replace 1% of pipeline system annually	Yes
4	Metering with Commodity Rates for all New Connections and Retrofit of Existing Connections	Meter implementation program currently under development; majority of commercial, industrial, and landscape connections metered	In Process
5	Large Landscape Conservation Programs and Incentives	None at this time; Water Conservation Ordinance applies to large landscapes, however	B/C Ratio = 5.6
6	High Efficiency-Washing Machine Rebate Programs	None at this time	B/C Ratio = 0.7
7	Public Information Programs	Conservation information included in bill inserts, newsletters, brochures, demonstration gardens, special events	Yes

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Table 5-1 (Continued)

DMM	Demand Management Measure Description	City Conservation Program	Compliance with UWMP Act
8	School Education Programs	K-6 classroom presentations *Currently suspended until full-time Water Conservation Coordinator position is filled	Yes
9	Conservation Programs for Commercial, Industrial, and Institutional (CII) Accounts	Water surveys not offered at this time; ULFT replacement program is available to CII accounts, however	B/C Ratio = 2.2
10	Wholesale Agency Programs	*Not Applicable*	*Not applicable*
11	Conservation Pricing	Meter implementation program will enable future conservation pricing	In Process
12	Water Conservation Coordinator	Position is currently vacant; part-time employees fulfill similar water conservation enforcement duties	Yes
13	Water Waste Prohibitions	Restrictions and penalties in place and enforced for wasted water; emergency conservation measures in place for emergency conditions	Yes
14	Residential Ultra-Low Flush Toilet Replacement Program	Rebates offered at the time of purchase for ULFTs	Yes

5.1 Demand Management Measures

5.1.1 DMM 1: Water Survey Programs for Single Family and Multi-Family Residential Customers

Implementation Description:

Water survey programs typically involve residential interior and exterior water use reviews whereby staff assist homeowners in identifying potential leaks and areas for water savings. Interior fixtures are checked and leak tested and irrigation systems are evaluated. Residents are generally provided with recommendations for improvements, plumbing retrofit kits and water conservation literature. Such programs can be very labor intensive as they require time to set up appointments with residents, plus the actual survey and follow-up time.

The City does not currently have a water survey program in place.

Cost/Benefit Analysis:

For this and all subsequent cost/benefit analyses, the value of conserved water is estimated at $1,532/million gallons (MG), or $500/acre-foot (AF), and the real discount rate is estimated at 6.15 percent. The value of the conserved water is based upon: 1) estimated costs for new well construction; 2) the costs associated with treatment and distribution of surface water supplies; and, 3) non-water utility benefits, such as reduced wastewater conveyance and treatment costs. Because it is up to the individual customer to implement recommendations from a survey, results can vary widely.

The CUWCC has estimated that the outdoor water use could be decreased by up to 10 percent for each unit surveyed. If 124 surveys are completed the first year, the outdoor water use could be decreased by approximately 4 AF. The number of surveys would increase at intervals throughout a ten year implementation program (based on CUWCC recommendations), with 446 surveys completed during the tenth year, resulting in savings of approximately 47 AFY. A snapshot of these savings is shown in Table 5-2.

Table 5-2: Cost-Benefit Analysis of DMM 1 (Guidebook Table A3)[a]

Water Survey Programs for Single Family and Multi-Family Residential Customers	
Total Costs	$116,892
Total Benefits	$101,368
Discount Rate	6.15%
B/C Ratio	0.87
Time Horizon (years)	13
Cost of Water (per AF)	$500
Average Water Savings (AFY)	25

Footnotes:

a. The term "Guidebook X" refers to the table in the *Guidebook to Assist Water Suppliers in the Preparation of a 2005 Urban Water Management Plan* by DWR.

The City does not currently budget for this program. With the filling of the currently vacant Water Conservation Coordinator position (DMM 12), the average cost of the survey program would be approximately $50 per survey. To complete the recommended 15 percent of the single-family unit surveys and 15 percent of the multi-family unit surveys over 10 years, it was assumed that the City would follow the implementation schedule provided by the CUWCC. Approximately 124 surveys would need to be completed the first year and 446 surveys in the tenth year. The life span of a water survey is approximately four years. This would result in a discounted cost of approximately $8,100 in the first year, and up to $17,040 in the tenth year. The benefit-to-cost (B/C) ratio is approximately 0.9. A B/C ratio below 1.0 is not considered beneficial; therefore, the City should not implement this program at this time.

Implementation Schedule:

Water Survey Programs: None at this time; will consider in the future

Methods to Improve Effectiveness:

As a member of CUWCC, the City could participate in a program to reduce the annual costs and increase the benefits to the City.

Non-Economic, Environmental, Social, Health, Technological, and Customer Impact Factors:

As the City becomes fully metered, this service may be requested by ratepayers. This factor will be taken into consideration.

Legal Authority:

The City has the legal authority to implement this DMM.

5.1.2 DMM 2: Residential Plumbing Retrofit

Implementation Description:

The City of Lodi's Water Conservation Rebate Program promotes the retrofitting of residential plumbing fixtures with low-flow and other water-saving devices, such as low-flow showerheads, hose bib manual timers for outside water hoses, and water heater blankets. Rebates of 50% of the cost of the device are given at the store at the time of purchase. The City of Lodi later reimburses the stores the cost of the rebate.

Methods to Evaluate Effectiveness:

The effectiveness of this program is based upon the number of rebates accepted for water conservation devices and the percentage of customers that install the equipment after purchasing the devices. The City currently tracks the number of rebates accepted. As the City becomes fully metered, the effectiveness of this DMM may be evaluated by comparing metered water use for customers before and after installation of water saving devices.

Conservation Savings:

Because it is up to the individual customer to purchase and install conservation devices, savings are difficult to quantify. The CUWCC estimates that a low-flow showerhead retrofit will save approximately 2.9 gallons per capita per day (gpcd) on post-1980 constructed homes and 7.2 gpcd on pre-1980 constructed homes. The average savings for a toilet retrofit is 1.3 gpcd on pre-1980 constructed homes only.

Based on the assumptions listed for Table 5-3, the City can expect to save approximately 0.2 AFY over the next five years. Additional water savings could be realized if the number of rebates accepted were to increase.

Budget:

The City's budget for this program has been between $600 and $2,300 for each of the last 5 years. The City's projected expenditures for future years are shown in the table below.

Implementation Schedule:

Rebate Program: On-going

Table 5-3 presents historical and projected data on the distribution and effectiveness of this DMM.

Table 5-3: Implementation of DMM 2 (Guidebook Tables B1-B2)

Category	2001	2002	2003	2004	2005
Low Flow Showerheads [a,b]	27	61	30	14	5
Hose Bib Timers [a,c]	5	10	2	8	0
Hot Water Heater Blankets [a,d]	7	10	13	6	2
Method of Replacement	Rebate	Rebate	Rebate	Rebate	Rebate
Water Savings, AFY	0.4	0.9	0.5	0.3	0.1
City Expenditures, $	2,278	1,398	1,540	1,066	658

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Table 5-3 (Continued)

Category	2006	2007	2008	2009	2010
Low Flow Showerheads [a,b]	10	10	10	10	10
Hose Bib Timers [a,c]	5	5	5	5	5
Hot Water Heater Blankets [a,d]	5	5	5	5	5
Method of Replacement	Rebate	Rebate	Rebate	Rebate	Rebate
Water Savings, AFY	0.2	0.2	0.2	0.2	0.2
City Expenditures, $	700	700	700	700	700

Footnotes:

a. Because rebates are offered at the store at the time of purchase, records for the rebate program did not distinguish between rebates accepted by single family or multi family accounts.
b. Water savings assume a savings of 2.9 gpcd, and 3.5 people/du.
c. Water savings assume a savings of 25 gpd/du, 3 watering days/wk, and 18 watering weeks/yr.
d. Water savings assume a savings of 3 gpcd, 3.5 people/du, and 1 shower/day.

Based on the assumptions listed above, the B/C ratio for this DMM is approximately 0.15. It should be noted, however, that this ratio is based on an assumptions that will be difficult to verify until the City becomes fully metered.

Methods to Improve Effectiveness:

The availability of the rebate program should be marketed towards areas with older homes that would not have low-flow fixtures installed. This marketing would maximize the benefit from these devices.

5.1.3 DMM 3: System Water Audits, Leak Detection and Repair

Implementation Description:

The City performs water audits upon request and responds to leaks as they occur. The City has also implemented a capital improvement program to replace water lines, with an ultimate goal of replacing 1 percent of the system annually. Locations where current water main size is a problem (typically 2- and 3-inch diameter mains) are evaluated first. Next, mains which are in backyards, and therefore the hardest to access for maintenance and repair, are targeted. Finally, the City examines the frequency of call outs and interviews maintenance crews to determine which mains are most problematic. Projections for future water main surveying and replacement are included in Table 5-4 below. The water/wastewater main replacement program was implemented in 2001.

Methods to Evaluate Effectiveness:

The best way to evaluate the effectiveness of this program is to compare water production data at the City's wells with water consumption from the City's customers. Without residential water meters in place to compare water supply and demand data, it is very difficult to evaluate the effectiveness of the pipeline replacement program. The City is in the process, however, of developing and implementing a residential metering program. For more information on the City's metering implementation plans, see DMM 4.

Conservation Savings:

Because the effectiveness cannot be determined without meters in place, savings have to be estimated. With over 20 thousand linear feet scheduled for replacement between 2006 and 2010, water savings will be realized. Assuming a two percent reduction in annual water production, savings in 2010 could be approximately 200 AFY.

Additional water savings could be realized if the amount of pipeline replaced were increased.

Budget:

The City's average annual budget for water main replacement was approximately $470,000 over the last five years. The City's projected expenditures for future years are shown in the table below.

Implementation Schedule:

Water Pipeline Replacement Program: On-going

Table 5-4 presents historical data on the distribution and effectiveness of this DMM.

Table 5-4: Implementation of DMM 3 (Guidebook Tables C1-C2)

Category	2001	2002	2003	2004	2005
Unaccounted-for Water	10%	10%	10%	10%	10%
Length of Mains Surveyed, ft	4,200	3,300	0	6,800	1,440
Length of Mains Replaced, ft	4,200	3,300	0	6,800	1,440
City Expenditures, $	266,500	661,360	0	1,156,000	274,000
Water Savings, AFY	-- [a]	-- [a]	-- [a]	-- [a]	-- [a]

(continued on next page)

Table 5-4 (Continued)

Category	2006	2007	2008	2009	2010
Unaccounted-for Water	10%	10%	10%	10%	10%
Length of Mains Surveyed, ft	1,000	5,000	5,000	5,000	5,000
Length of Mains Replaced, ft	1,000	5,000	5,000	5,000	5,000
City Expenditures, $	100,000	375,000	375,000	375,000	375,000
Water Savings [b], AFY	199	200	201	201	202

Footnotes:

a. Data unavailable.

b. Assumes a 1 percent reduction in annual demand based on water main replacement, based on discussions with City staff.

Based on the assumption listed above, the B/C ratio for this DMM is approximately 0.31. It should be noted, however, that this ratio is based on an assumption (i.e., 1% annual water savings as a result of water main replacement) that is rather difficult to verify.

Methods to Improve Effectiveness:

The City should develop a regular leak detection program to focus work areas for the future. In addition, as a member of CUWCC, the City could receive assistance to develop a leak detection program, especially in unmetered areas of the City.

5.1.4 DMM 4: Metering with Commodity Rates for all New Connections and Retrofit of Existing Connections

Assembly Bill 2572

Assembly Bill No. 2572 (AB 2572) became law in 2004 and promulgated that all urban water suppliers are required to install water meters on all residential, commercial, and industrial services constructed prior to 1992.

According to the language in AB 2572, the City must:

- Install water meters by January 1, 2025 on all municipal and industrial water service connections constructed before 1992; and,
- On or before January 1, 2010, to charge each customer that has a service connection for which a meter has been installed, based on volume of deliveries, as measured by the water meter.

Implementation Description:

Installing water meters and billing for actual water use provides a strong incentive for customers to use less water and equalizes service costs for each customer to their actual use (high water users pay a more equitable share of the system costs). Water metering can reduce exterior landscape water use and can also achieve a modest reduction in interior water use.

The City currently meters and bills for actual water used for most of its commercial/institutional, industrial, and landscape customers. These customers are billed monthly based on a monthly service charge (based on meter size) and a quantity charge (based on actual water consumption). For these customers, actual water use is billed at one rate ($0.723 per 100 cubic feet, or $314 per AF).

Although the City does not currently bill multi- or single-family residential units for actual water used, the City is in the process of developing a residential metering program.

Table 5-5: City of Lodi Water Service Commodity Rates

Type of Service Connection		Monthly Service Charge	
Metered Service Connection	Metered Rate[a]	$ 0.723	per 100 cu. ft. (approx. 96.7¢ per 1,000 gal.)
	Monthly Base Charge[a]	$ 19.27	¾" meter
		$ 28.90	1" meter
		$ 38.53	1½" meter
		$ 48.18	2" meter
		$ 67.45	3" meter
		$ 86.72	4" meter
		$ 125.27	6" meter
		$ 163.81	8" meter
		$ 202.35	10" meter

Footnotes:

a. Currently applies only to metered commercial/institutional, industrial, and landscape accounts. The City is in the process of gathering water use data to develop commodity billing rate structures for metered residential accounts.

Methods to Evaluate Effectiveness:

The best way to evaluate the effectiveness of metering is a periodic review of customer water use. Additionally, current water use per capita can be compared with historic data (before and after commodity rates are established.)

Conservation Savings:

CUWCC has estimated that metered accounts may result in a 10 to 20 percent reduction in demand compared to non-metered accounts. For the purposes of this UWMP, a reduction of 15 percent has been assumed. This reduction could result in a savings for the City of approximately 3,800 AFY in 2030. Depending on the commodity rate structure developed by the City, certain additional savings could possibly be realized.

Budget:

The total construction and implementation cost of the City's metering implementation program has not been formally projected at this time. Implementation costs include public outreach, engineering, inspections, and the City's administration of the program. Upon finalization of the City's Draft Water Meter Policy, budget projections for this program should become available.

Implementation Schedule

Billing at Commodity Rates for Existing Commercial/Industrial:	On-going
Retrofit Meter Installation:	Beginning in 2006 or 2007

Table 5-6: Implementation of DMM 4 (Guidebook Tables D1-D2)

Category	2001	2002	2003	2004	2005
Number of Unmetered Accounts [a]	15,990	16,350	16,640	16,920	17,500
Number of Retrofit Meters Installed [b]	0	0	0	0	0
Number of Accounts w/o Commodity Rates [c]	15,990	16,350	16,640	16,920	17,500
City Expenditures, $	0	0	0	0	0
Water Savings, AFY	0	0	0	0	0

(continued on next page)

Table 5-6 (Continued)

Category	2006	2007	2008	2009	2010
Number of Unmetered Accounts [a]	17,760	16,800	15,850	14,890	13,940
Number of Retrofit Meters Installed [b]	0	950	950	950	950
Number of Accounts w/o Commodity Rates [c]	17,760	16,800	15,850	14,890	13,940
City Expenditures, $	--[d]	--[d]	--[d]	--[d]	--[d]
Water Savings, AFY	0	175	350	525	700

Footnotes:

a. Assumes a 1.5% annual increase in the number of service connections.
b. Based on discussions with City staff, a minimum of approximately 950 meters will need to be installed each year for 18 years if the City begins implementation in 2006-2007. Although it is likely that the City will fully implement its metering program in a shorter period of time (closer to 15 years, per discussions with City staff), the information in this UWMP reflects a more gradual timeline.
c. Based on preliminary discussions with City staff, metered accounts will be billed at commodity rates immediately upon meter installation.
d. Data unavailable at the time of UWMP preparation. The City is currently in the process of finalizing its Water Meter Policy, which will likely yield firm projections for expenditures.

Methods to Improve Effectiveness

As the first group of existing residential service connections become metered, the City should begin collecting meter data. This would establish a baseline of water use for later comparison. In addition, as a member of CUWCC, the City could receive assistance on obtaining grant funding to implement a meter retrofit program or feasibility study.

5.1.5 DMM 5: Large Landscape Conservation Programs and Incentives

Implementation Description:

The City's Parks Division has implemented a water management program for major parks. The Division has installed "Maxicom" irrigation controllers, telecommunications equipment and related hardware and software to better manage park irrigation. In addition, the City's water conservation ordinance applies to large landscaped areas.

The City does not currently perform water conservation surveys for large landscapes.

Cost/Benefit Analysis:

For this cost/benefit analysis, the value of conserved water is estimated at $500/AF, and the real discount rate is estimated at 6.15 percent. The value of the conserved water is based upon the City's water production costs. Because it is up to the individual customer to implement recommendations from a survey, results can vary widely.

CUWCC has estimated that surveys can reduce landscape water usage by 15 percent. If 10 surveys are completed during the first year, the outdoor water use could be decreased by approximately 12 AF. Savings of approximately 47 AFY would be realized during the tenth year. A snapshot of these savings is shown in Table 5-7. To complete the recommended number of surveys over 10 years (15 percent of the total number of large landscape accounts), it was assumed that the City would follow the implementation schedule provided by the CUWCC.

Table 5-7: Cost-Benefit Analysis of DMM 5 (Guidebook Table E3)

Large Landscape Conservation Programs and Incentives	
Total Costs	$26,678
Total Benefits	$150,207
Discount Rate	6.15%
B/C Ratio	5.6
Time Horizon (years)	13
Cost of Water (per AF)	$500
Average Water Savings (AFY)	34

The City does not currently budget for this program. The cost of a survey has been estimated at $250 per acre. Approximately 10 surveys would need to be completed the first year and 38 surveys in the tenth year. The life span of a large landscape water survey is approximately four years. This would result in a discounted cost of approximately $3,670 in the first year, and up to $2,590 in the tenth year. The benefit-to-cost (B/C) ratio is approximately 5.6. A B/C ratio above 1.0 is considered beneficial; therefore, the City should consider implementing this program.

Implementation Schedule:

Water Management Program for Major Parks:	On-going
Applicability of Water Conservation Ordinance to Large Landscapes:	On-going

Methods to Improve Effectiveness:

It is recommended that the City examine the evapotranspiration information available from the California Irrigation Management Information System (CIMIS). This information will allow the City to determine

the water required to efficiently irrigate turf and landscaping areas as weather conditions change over the year. As a member of CUWCC, the City could receive assistance in obtaining grant funding to develop a program to provide incentives to commercial and industrial customers and home developers to reduce landscape irrigation demands.

Non-Economic, Environmental, Social, Health, Technological, and Customer Impact Factors:

A program such as this may be requested by large landscape customers in the future. This factor will be taken into consideration.

Legal Authority:

The City has the legal authority to implement this DMM.

5.1.6 DMM 6: High-Efficiency Washing Machine Rebate Programs

Implementation Description:

Typically, a high-efficiency washing machine rebate would offer a $75 to $100 rebate to qualifying customers that install them in their homes. The City does not currently offer this program.

Cost/Benefit Analysis:

The cost/benefit analysis presented below reflects the following assumptions: each rebate will cost $75; a high-efficiency washing machine rebate will reduce water usage by 5,100 gallons per year; rebates will be accepted by one percent of single-family residences per year for 20 years; and, the lifespan of a high efficiency washing machine is 12 years.

Table 5-8: Cost-Benefit Analysis for DMM 6 (Guidebook Table F3)

High-Efficiency Washing Machine Rebate Programs	
Total Costs	$118,077
Total Benefits	$86,445
Discount Rate	6.15%
B/C Ratio	0.7
Time Horizon (years)	18
Cost of Water (per AF)	$500
Average Water Savings (AFY)	24

The B/C ratio for this DMM is approximately 0.7. Since this B/C ratio is less than 1.0, it is not currently cost-effective for the City to implement this DMM.

Implementation Schedule:

High-Efficiency Washing Machine Rebate Program: Not planned at this time

Methods to Improve Effectiveness:

The City should investigate if the local energy company would be interested in sharing the costs for a rebate program. Additionally, the City should pursue grant funding if it is available. As a member of CUWCC, the City could receive assistance obtaining grant funding to implement this program. The City should consider developing a rebate program for multi-family units and mandating the provision of high-efficiency washers in new multi-family construction.

Non-Economic, Environmental, Social, Health, Technological, and Customer Impact Factors:

As the City becomes fully metered, this service may be requested by ratepayers. This factor will be taken into consideration.

Legal Authority:

The City has the legal authority to implement this DMM.

5.1.7 DMM 7: Public Information Programs

Implementation Description:

The City's Water Conservation Program participates in local fairs, including the Crime Prevention Fair (sponsored by the City of Lodi Police Dept.), the Conservation Fair (sponsored by local agencies concerned with conservation), the Lodi Grape Festival and Harvest Fair, and other special events. Staff converse with fair visitors about Lodi's water conservation program and answer questions concerning water issues. The City also hands out information sheets, conservation kits and holds contests for prizes such as low-flow showerheads. Additionally, watering day reminders have been periodically included on the utility bills and on Lodi's cable TV station throughout the summer months. Newspaper articles and ads are also published throughout the year in Lodi's and Stockton's newspapers reminding Lodi residents of the water conservation regulations, offering conservation tips, and relaying the successes of the program. Refrigerator magnets with the watering day and hour schedules are given out by City staff and at the local fairs. The City provides all of the water conservation information on the City's website. This program was implemented in 1977.

Methods to Evaluate Effectiveness:

The effectiveness of this program is determined by the amount of information available to the community. To evaluate the information, the City tracks the number of brochures distributed, special events attended, and other activities pursued to promote water conservation. The City also tracks customer response and any commentary regarding the information provided.

Conservation Savings:

CUWCC has not determined any methods to quantify the savings from this DMM; however, the City believes that this program is beneficial and necessary to implement other DMMs effectively.

Budget:

This program does not have its own budget, and is instead funded from the City's Water Conservation Program account.

Implementation Schedule:

Table 5-9: Implementation of DMM 7 (Guidebook Tables G1-G2)

Category	2000-01	2001-02	2002-03	2003-04	2004-05
Paid Advertising	1	1	1	1	1
Bill Inserts/ Newsletters/ Brochures	20,000+ (CCR[a])	20,000+ (CCR[a])	20,000+ (CCR[a])	20,000+ (CCR[a])	20,000+ (CCR[a])
Bill showing Water Usage in Comparison to Previous Year's Usage [c]	1,024 x 12 mo.	1,060 x 12 mo.	1,065 x 12 mo.	1,075 x 12 mo.	1,085 x 12 mo.
Demonstration Gardens	1	1	1	1	1
Special Events/ Media Events	3	3	3	2	3
City Expenditures, $	--[b]	--[b]	--[b]	--[b]	--[b]

(continued on next page)

Table 5-9 (Continued)

Category	2005-06	2006-07	2007-08	2008-09	2009-10
Paid Advertising [d]	1	1	1	1	1
Bill Inserts/ Newsletters/ Brochures	20,000+ (CCR[a])	20,000+ (CCR[a])	20,000+ (CCR[a])	20,000+ (CCR[a])	20,000+ (CCR[a])
Bill showing Water Usage in Comparison to Previous Year's Usage [c]	1095 x 12 mo.	1105 x 12 mo.	1115 x 12 mo.	1125 x 12 mo.	1135 x 12 mo.
Demonstration Gardens [d]	1	1	1	1	1
Special Events/ Media Events [d]	3	3	3	3	3
City Expenditures, $	--[b]	--[b]	--[b]	--[b]	--[b]

Footnotes:

a. "CCR" refers to the annual water quality report distributed to customers in bill inserts. Bill inserts always contain a water conservation section, but are not included as part of the Water Conservation Program budget.
b. Expenditures for the public education items in this table (with the exception of CCR – see footnote (a)), are funded by the Water Conservation Program account.
c. Water usage bill comparisons for future years assume an increase of 10 comparisons x 12 months for each year, similar to data from 2003-2005.
d. Assumes a continuation of current practices.

Methods to Improve Effectiveness:

Public information can be one of the best tools to conserve water. The City can continue to improve its public information program by including water conservation information on the City's website. A citizens' advisory committee could assist in developing new ways to communicate with the public and the media about water conservation and other resource issues. Filling the currently vacant Water Conservation Coordinator position could optimize the program by coordinating additional opportunities for community speakers and special events. In addition, as a member of CUWCC, the City could participate in regional public outreach programs, including paid advertising on television and radio.

5.1.8 DMM 8: School Education Programs

Implementation Description:

A Water Educational Program was introduced to Lodi elementary schools in 1986. This program supplements and enhances the City's total effort to conserve water, as well as other natural resources. In 1986, four pilot schools were introduced to the program. Presentations have been given in 10 schools within the Lodi City limits. (As of 1998, there had been 252 classroom presentations). The program includes water science demonstrations with the objective of instilling water awareness and providing information about Lodi's water system and water conservation techniques.

The education program is aimed at grades K through 6. It is felt to be most cost effective to develop water awareness and a sense for water conservation while children are most impressionable during their formative years. A more detailed discussion of the educational program is contained in **Appendix C.**

Methods to Evaluate Effectiveness:

The effectiveness of this program is determined by the number of students and schools that participate. The City, therefore, will track the number of presentations and tours given, curriculum materials provided, and students that participate. The City should also survey the institutions and educators that participate in the programs and obtain recommendations for improvement.

Conservation Savings:

CUWCC has not determined any methods to quantify the savings of this DMM, but the City believes that this program is beneficial to the community and important to the long-term success of the overall water conservation program.

Budget:

This program does not have its own budget, and is instead funded from the City's Water Conservation Program account.

Implementation Schedule:

Table 5-10: Implementation of DMM 8 (Guidebook Tables H1-H2)

Category	2000-01	2001-02	2002-03	2003-04	2004-05
Grades K–6th	55	64	0	0	0
City Expenditures, $	--[b]	--[b]	--[b]	--[b]	--[b]

(continued on next page)

Table 5-10 (Continued)

Category	2005-06	2006-07	2007-08	2008-09	2009-10
Grades K–6th	24[a]	24[a]	24[a]	24[a]	24[a]
City Expenditures, $	--[b]	--[b]	--[b]	--[b]	--[b]

Footnotes:

a. Projections for this program represent the average number of classroom visits between 2000 and 2005. More firm projections may become available as the City refines its Water Conservation Program and the Water Conservation Coordinator position.

b. Expenditures for this program are funded by the Water Conservation Program account.

Methods to Improve Effectiveness:

Similar to a public information program, a school education program can also be one of the best tools to conserve water. The American Water Works Association (AWWA) and the Water Education Foundation (WEF) provided educational material for youth to explain both the water cycle and pollution, and to promote water conservation, including videos, bookmarks, games, and water experiments. The City can continue to improve its school education program by including additional material available from AWWA and WEF. Filling the currently vacant Water Conservation Coordinator position (or a similar position) will enhance the program by facilitating meetings with school principals and educators to promote classroom presentations. In addition, as a member of CUWCC, the City could receive additional education materials and information on ways to target the curriculum to specific age groups to effectively teach students.

According to discussions with City staff, setting up classroom presentations has become more difficult since 2002, due primarily to changes in curriculum and less freedom for educators to participate in programs such as this. For these reasons, an average of 24 classroom presentations per year is likely to remain normal for the foreseeable future.

5.1.9 DMM 9: Conservation Programs for Commercial, Industrial and Institutional Accounts

Implementation Description:

The City's water conservation program and ordinance applies to all customers. When considering the largest customers, most of them are covered under other conservation mechanisms; however, the City will evaluate implementing additional programs as staff constraints and budgetary considerations permit. The cost/benefit analysis presented below was based on a ULFT retrofit program for commercial, industrial, and institutional (CII) accounts. The City has a ULFT retrofit program that has been available to CII accounts since April 2001. While there has been some activity by CII accounts in utilizing the ULFT program, there has not been an effort to target these accounts with specific promotional materials. The City does not currently perform water use surveys for CII accounts.

Cost/Benefit Analysis:

The B/C analysis presented below reflects the following assumptions: an analyst survey (for commercial and institutional accounts) costs $680 and will reduce annual water usage by 0.83 AF/account, while a consultant survey (for industrial accounts) costs $1,680 and will reduce annual water usage by 2.1 AF/account; the lifespan of a water use survey for CII accounts is approximately 4 years; and, approximately 10 percent of CII accounts will be surveyed over an eight-year period. To complete the recommended number of surveys over eight years, it was assumed that the City would follow the implementation schedule provided by the CUWCC. This would result in a total of approximately 138 surveys.

Table 5-11: Cost-Benefit Analysis for DMM 9 (Guidebook Table I3)

Conservation Programs for Commercial, Industrial, and Institutional Accounts	
Total Costs	$79,847
Total Benefits	$179,032
Discount Rate	6.15%
B/C Ratio	2.2
Time Horizon (years)	11
Cost of Water (per AF)	$500
Average Water Savings (AFY)	44

The B/C ratio for this DMM is approximately 2.2. A B/C ratio above 1.0 is considered beneficial; therefore, the City should consider implementing this program.

Methods to Improve Effectiveness:

The City should gather information about coordination and cost-sharing with local energy utilities to provide surveys for CII customers. In addition, as a member of CUWCC, the City could participate in several programs aimed at water conservation for CII accounts. These programs could include developing a database of commercial and industrial water use and providing surveys for facilities to promote water conservation.

Non-Economic, Environmental, Social, Health, Technological, and Customer Impact Factors:

As the City becomes fully metered, this service may be requested by ratepayers. This factor will be taken into consideration

Legal Authority:

The City has the legal authority to implement this DMM.

5.1.10 DMM 10: Wholesale Agency Programs

This DMM applies to wholesale agencies only and is therefore not applicable to the City. The City's wholesale supplier is WID.

5.1.11 DMM 11: Conservation Pricing

Implementation Description:

Since the majority of the City's non-residential customers are metered, the single-block commodity rate for water encourages water conservation. The City's wastewater billing policies for some of these customers also reflect water use, which provides an additional incentive for conservation.

Methods to Evaluate Effectiveness:

Conservation pricing is often cited as a means to have market mechanisms provide incentives for conservation. Water consumption, however, has a relatively inelastic demand relative to price, meaning as unit prices go up, unit demand does not correspond in a 1:1 linear fashion. This is due to a variety of factors. Only a portion of water use for a residence can be considered discretionary, generally a portion of landscaping use and excess showering periods and the like. Most use is simply a basic function of existence. At the point discretionary use has been rung out of the system due to marginal costs of water, another rate tier is unlikely to reap much conservation savings. Further, such tiers can be considered discriminatory against larger families, which could have a low per-capita use but a large household consumption relative to another household. Additionally, California's Proposition 218 requires water rates to be developed on a cost of services bases. In other words, the top tier of the water rate must have a reasonable relationship to the avoided cost of service for marginal supply.

Conservation Savings:

Water savings due to conservation pricing are difficult to determine, since the City is currently in the process of developing a meter implementation plan. It is reasonable to assume, however, that certain additional savings could be realized based on the City's as yet undetermined commodity rate structure.

Budget:

The City does not currently budget for this DMM; however, the City is currently developing a metering implementation program that will address this DMM. See DMM 4 for budget information.

Implementation Schedule:

As the City finalizes its metering implementation program, further development of conservation pricing will be enabled. See DMM 4 for more information regarding the City's proposed metering implementation schedule.

Methods to Improve Effectiveness:

The City should consider developing tiered rates keyed to actual water consumption to encourage water conservation. They should start with the commercial and industrial users, as these customers are already being charged based on actual water use. In addition, the City should consider charging a sewer service rate for *all* commercial and industrial customers also based on volume.

5.1.12 DMM 12: Water Conservation Coordinator

Implementation Description:

Although the City's Water Conservation Coordinator position is currently unfilled, several of the City's employees work part-time to perform many of the same duties. The City intends to fill the Water Conservation Coordinator position, or a position similar to it, as early as possible. The program was started in 1989.

Methods to Evaluate Effectiveness:

The effectiveness of this DMM is determined by the work performed by the Water Conservation Coordinator. The City should set up performance standards and goals, and compare them with the results.

Conservation Savings:

CUWCC has not determined any methods to quantify the savings of this DMM, but the City believes that this program is beneficial to the community and important to the long-term success of the overall water conservation program.

Budget:

Annual expenditures for this program, which is funded by the City's Water Conservation Program account, are included in **Table 5-12** below.

Implementation Schedule:

Water Conservation Coordinator: On-going

Table 5-12: Implementation of DMM 12 (Guidebook Tables L1-L2)

Category	2000	2001	2002	2003	2004	2005
Number of full-time positions	1	1	1	0	0	1[a]
Number of part-time staff	7	7	7	4	3	5[a]
Number of part-time staff in full time equivalents	1.8	2.1	1.9	1.2	1.0	1.6[a]
City Expenditures [b], $	55,499	68,152	69,552	34,743	25,620	50,713[a]

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Table 5-12 (Continued)

Category	2006	2007	2008	2009	2010
Number of full-time positions	1[a]	1[a]	1[a]	1[a]	1[a]
Number of part-time staff	5[a]	5[a]	5[a]	5[a]	5[a]
Number of part-time staff in full time equivalents	1.6[a]	1.6[a]	1.6[a]	1.6[a]	1.6[a]
City Expenditures [b], $	50,713[a]	50,713[a]	50,713[a]	50,713[a]	50,713[a]

Footnotes:

a. Projections for this program represent the averaged data from fiscal years 2000-01 to 2004-05. More firm projections may become available as the City refines its Water Conservation Program and the Water Conservation Coordinator position.

b. Expenditures for this program represent the total full-time and part-time expenditures under "Personnel" in the Water Conservation Program budget. Expenditures are shown in 2005 dollars.

Methods to Improve Effectiveness:

As a member of CUWCC, the City's Water Conservation Coordinator could receive assistance as necessary to improve the City's conservation programs.

5.1.13 DMM 13: Water Waste Prohibitions

Implementation Description:

The City's existing Water Conservation Ordinance (Lodi Municipal Code, Chapter 13.08, Article III), defines water waste prohibitions for the City's customers. The Ordinance provides several definitions of "waste of water," outlines watering days and hours, describes the City's enforcement procedures, and discusses the processes of violations, infractions, and appeals. A copy of the City's Water Conservation Ordinance is included in **Appendix C.** This program was implemented in 1977.

Methods to Evaluate Effectiveness:

The effectiveness of this DMM can be determined by a decrease in violators. The number of citations and violations should continue to be reported annually. If an area is determined to have excessive violations, the City should implement a specific public outreach program informing the public about the specific ordinance.

Conservation Savings:

The CUWCC has not determined any methods to quantify the savings of this DMM but the City believes that this program is necessary to curtail flagrant water waste situations. Per capita water usage, as outlined in Table 4-2, has decreased in recent years. Although it is difficult to extract the savings associated with individual DMMs from this reduction, it is reasonable to assume that a significant portion of the reduction is attributable to the City's Water Conservation Ordinance.

Budget:

Annual expenditures for this program, which is funded by the City's Water Conservation Program account, are included in **Table 5-13** below.

Implementation Schedule:

Table 5-13: Implementation of DMM 13 (Guidebook Tables M1-M2)

Category	2000-01	2001-02	2002-03	2003-04	2004-05
Waste Ordinance in Effect	Yes	Yes	Yes	Yes	Yes
Number of On-site Visits	3,677	1,557	2,973	1,217	3,163
Water Softener Ordinance	No	No	No	No	No
City Expenditures [b], $	65,846	78,017	73,239	36,921	28,443

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Table 5-13 (Continued)

Category	2005-06	2006-07	2007-08	2008-09	2009-10
Waste Ordinance in Effect	Yes	Yes	Yes	Yes	Yes
Number of On-site Visits	2,517 [a]	2,517 [a]	2,517 [a]	2,517 [a]	2,517 [a]
Water Softener Ordinance	No	No	No	No	No
City Expenditures [b], $	56,493 [a]	56,493 [a]	56,493 [a]	56,493 [a]	56,493 [a]

Footnotes:

a. Projections for this program represent the averaged data from fiscal years 2000-01 to 2004-05. More firm projections may become available as the City refines its Water Conservation Program and the Water Conservation Coordinator position.

b. Total expenditures of "Water Conservation" in program account.

Methods to Improve Effectiveness:

The City should continue to monitor the effectiveness of this DMM. The filling of the currently vacant Water Conservation Coordinator position (DMM 12) would greatly aid in this effort.

5.1.14 DMM 14: Residential Ultra-Low Flush Toilet (ULFT) Replacement Programs

Implementation Description:

The City's Building Code requires that all new residential construction and major remodels or renovations of existing homes install low flow fixtures, including low flow toilets and showerheads.

Additionally, the City offers a rebate program for water saving devices, including ULFTs, low-flow showerheads, hose bib timers, and water heater blankets. Rebates for 50 percent of the cost of the device are given at the store at the time of purchase. The City later reimburses the stores the cost of the rebate. This program was implemented in 2001.

Methods to Evaluate Effectiveness:

The effectiveness of this program is based upon the number of rebates accepted for water conservation devices and the percentage of customers that install the equipment after purchasing the devices. The City currently tracks the number of rebates accepted. As the City becomes fully metered, the effectiveness of this DMM may be evaluated by comparing metered water use for customers before and after installation of water saving devices.

Conservation Savings:

Programs such as these have been shown to produce savings of approximately 1.9 gallons per flush over high-water-using toilets. Estimates for the City's water savings as a result of the rebate program are provided in the table below. Additional water savings could be realized if there was an increase in the number of customers accepting ULFT replacement rebates. Reduced wastewater treatment and disposal is an additional benefit of this program.

Budget:

The City's annual expenditures have been between $1,500 and $5,300 for the each of the last five years. The City's proposed expenditures for future years are shown in the table below.

Implementation Schedule:

Rebates for ULFT replacements: On-going

Table 5-14: Implementation of DMM 14 (Guidebook Tables N1-N4)

Category	2001	2002	2003	2004	2005
# of ULFT replacements [a]	155	46	92	74	71
Method of Replacement	Rebate	Rebate	Rebate	Rebate	Rebate
Water Savings, AFY	4.5	1.3	2.7	2.1	2.1
City Expenditures, $	5,270	1,564	3,128	2,516	2,414

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Table 5-14 (Continued)

Category	2006	2007	2008	2009	2010
# of ULFT replacements [a]	75	75	75	75	75
Method of Replacement	Rebate	Rebate	Rebate	Rebate	Rebate
Water Savings, AFY	2.2	2.2	2.2	2.2	2.2
City Expenditures, $	2,550	2,550	2,550	2,550	2,550

Footnotes:

a. Because rebates are offered at the store at the time of purchase, records for the rebate program cannot distinguish between rebates accepted by single family or multi family accounts.

Based on the assumptions listed above, the B/C ratio for this DMM is approximately 0.43. It should be noted, however, that this ratio is based on an assumption is difficult to verify until the City becomes fully metered.

Methods to Improve Effectiveness:

The City could realize more water savings if existing homes with high-water-using toilets were targeted with promotional material for the rebate program. To increase the number of retrofits for existing homes, the City should pursue any opportunities for grants. Membership in CUWCC could facilitate this.

5.1.15 Evaluation of DMMs Not Implemented

Table 5-15 provides a summary of the DMMs not currently being implemented by the City. The net present value (NPV) per AF associated with each DMM represents the total value, in 2005 dollars, of the lifetime water savings estimated for each DMM. For comparison, the DMMs with negative NPV/AF values in Table 5-15 correspond to the B/C ratios of less than one shown in Table 5-2, and vice-versa.

Table 5-15: Evaluation of DMMs Not Implemented

DMM No.	Description	NPV per AF
1	Water Survey Programs for Single-family Residential and Multi-family Residential Customers	- $ 56
5	Large Landscape Conservation Programs and Incentives	$ 276
6	High-efficiency Washing Machine Rebate Programs	- $ 73
9	Conservation Programs for Commercial, Industrial, and Institutional (CII) Accounts	$ 203

Chapter 6

Water Supply Reliability

Chapter 6 Water Supply Reliability

This section provides a description of the potential variability in the City's water supplies caused by environmental, legal, and climatic factors, as well as the steps being taken by the City to address these potential concerns.

6.1 Climate

In California, climate can significantly affect the reliability of water supplies in certain regions. This section analyzes the vulnerability of the City's water supplies to climatic effects.

6.1.1 Reliability and Vulnerability of Water Supply to Seasonal or Climatic Changes

Groundwater

Although the City's groundwater basin is replenished in part by the Mokelumne River, the annual quantity of groundwater available does not vary significantly due to seasonal or climatic changes. Additionally, seasonal or climatic changes are not expected to impair the City's ability to extract groundwater, as seven of the City's wells are equipped with emergency generators.

Surface Water

The reliability of the City's surface water supply may be affected by drought. The City's contract for surface water delivery from WID, which diverts water from the Mokelumne River, is subject to curtailments of up to fifty percent during dry years. WID is required by the contract to annually provide the City, on or about May 1, with a preliminary estimate of whether or not the City's deliveries will be curtailed in a given year. Final estimates of any curtailment in a given year must be provided to the City on or about July 1.

Recycled Water

The amount of recycled water available to the City comes primarily from indoor water use within the City's limits and is not expected to fluctuate significantly due to seasonal or climatic changes.

6.2 Projected Normal Water Year Supply

During normal water years, no curtailments or other reductions in supply are expected for any of the City's supplies. The projected normal water year supplies from 2010 to 2030 are shown in **Table 6-1**.

Table 6-1: Water Supply Reliability (Guidebook Table 8)[a]

Water Year Type	Supply Type	2010	2015	2020	2025	2030
Normal	Groundwater, AFY	15,000	15,000	15,000	15,000	15,000
	Surface Water, AFY	6,000	6,000	6,000	6,000	6,000
	Recycled Water [b], AFY	7,700	8,300	8,940	9,630	10,380
	Total [c], AFY	***28,700***	***29,300***	***29,900***	***30,600***	***31,400***

Footnotes:

a. The term "Guidebook X" refers to the table in the *Guidebook to Assist Water Suppliers in the Preparation of a 2005 Urban Water Management Plan* by DWR.
b. Extrapolated from the amount of wastewater treated in 2004. Assumes that the permitted capacity of WSWPCF will be increased as necessary.
c. Rounded to the nearest hundred

6.3 Projected Single Dry Year Supply

During single dry water years, there may be up to a 10.5 percent reduction[3] in the City's normal combined water supplies, reflecting a 50 percent curtailment in the City's surface water supply by WID. No reductions are assumed for the City's recycled water or groundwater supplies. The projected single dry water year supplies from 2010 to 2030 are shown in **Table 6-2**.

6.4 Projected Multiple Dry Year Supply

Because the City's surface water supply is the only supply that is considered to be susceptible to dry water years, and because 50 percent is the maximum annual curtailment allowed under the City's contract with WID, supplies available during multiple dry water years are assumed to be no different than supplies available during single dry water years. The projected multiple dry water year supplies from 2010 to 2030 are shown in **Table 6-2**.

Table 6-2: Single Dry and Multiple Dry Water Year Supply Projections (Guidebook Table 8)

Water Year Type	Supply Type	2010	2015	2020	2025	2030
Single Dry	Groundwater, AFY	15,000	15,000	15,000	15,000	15,000
	Surface Water, AFY	3,000	3,000	3,000	3,000	3,000
	Recycled Water [a], AFY	7,700	8,300	8,940	9,630	10,380
	Total [c], AFY	***25,700***	***26,300***	***26,900***	***27,600***	***28,400***
Multiple Dry	Groundwater, AFY	15,000	15,000	15,000	15,000	15,000
	Surface Water, AFY	3,000	3,000	3,000	3,000	3,000
	Recycled Water [a], AFY	7,700	8,300	8,940	9,630	10,380
	Total [c], AFY	***25,700***	***26,300***	***26,900***	***27,600***	***28,400***
Summary	Single Dry Water Year, AFY	25,700	26,300	26,940	27,630	28,380
	% of Normal	**90%**	**90%**	**90%**	**90%**	**90%**
	Multiple Dry Water Year(s), AFY	25,700	26,300	26,940	27,630	28,380
	% of Normal	**90%**	**90%**	**90%**	**90%**	**90%**

Footnotes:

a. Extrapolated from the amount of wastewater treated in 2004. Assumes that the permitted capacity of WSWPCF will be increased as necessary.

b. Rounded to the nearest hundred

The future supply volumes presented in Sections 6.2 to 6.4 represent the water to which the City has the legal rights to use. This should not be confused with water that can readily be distributed to the Utility's customers, as additional infrastructure must be constructed before the total volumes presented in the tables above can be distributed to the City. In order to provide the City with surface water, for example, intake facilities, a surface water treatment plant, and additional distribution pipeline will be required.

6.4.1 Minimum Supply Volumes for the Next Three Years

Under agreements with the East Bay Municipal Utilities District (EBMUD), WID obtains water stored in Pardee and Comanche reservoirs. Since both of these reservoirs are currently full, supply volumes for the City of Lodi for the next three years are expected to be "normal." However, the minimum supply volumes for 2006 through 2008, or the supplies available if the City's contract with WID faced maximum curtailments, are presented in Table 6-3.

[3] Assuming that the amount of available recycled water increases over time, the maximum percent reduction projected will decrease from 10.5 percent in 2010 to 9.6 percent in 2030.

Table 6-3: Minimum Supply Volumes for 2006-2008 (Guidebook Table 24)

Supply Type	2006	2007	2008
Groundwater, AFY	15,000	15,000	15,000
Surface Water, AFY	3,000	3,000	3,000
Recycled Water, AFY	7,200	7,300	7,400
Total, AFY	**25,200**	**25,300**	**25,400**

Footnotes:

a. Reflects the total amount of wastewater available to the City for reclamation and reuse.

6.4.2 Basis for Normal, Single Dry and Multiple Dry Year Water Data

The data presented in Sections 6.2 through 6.4 were developed based on 1) the assumptions that the City's groundwater and recycled water supplies are not susceptible to short term drought conditions, and 2) the City's contract with WID. Since the City's contract with WID is relatively new, there have been no historical curtailments in the City's surface water supply upon which to base future dry water year projections. Hence, the maximum allowable curtailment has been assumed for these circumstances. The base year for all water year data is 2005.

Table 6-4: Basis of Water Year Data (Guidebook Table 9)

Water Year Type	Base Year
Normal	2005
Single Dry	2005
Multiple Dry	2005

6.5 Supply Inconsistencies

Water supply from the City's only wholesale supplier, WID, is susceptible primarily to drought conditions, when diversions from the Mokelumne River may be reduced by WID. Due to the infancy of this contract, there are no historical reductions upon which to base assumptions. Even in the most severe drought conditions, however, WID may only reduce the City's supply by 50 percent. Supply reliability projections for this source are presented in Table 3-7.

Water supply from the City's groundwater wells is considered to be very consistent. Historical fluctuations in groundwater levels due to changes in climatic conditions have been minor, and have not significantly impacted well production capacity. Additionally, six of the City's wells are equipped with granular activated carbon (GAC), and provide added insurance against inconsistencies caused by the presence of contaminants in the City's aquifer. Finally, the availability of seven emergency generators at various well locations ensures the City's ability to extract groundwater during extended power outages.

As discussed previously, the groundwater basin underlying the City is in overdraft, and groundwater levels are decreasing by approximately 0.39 ft/yr. From an extraction standpoint, however, this is a relatively slow process, and the City does not anticipate that overdrafting conditions will significantly impact its ability to extract groundwater in the short term. However, the City remains committed to eliminating the overdraft condition in the long term and has been an active participant in actions to accomplish this task. As a member of GBA, the City has participated in the development of regional groundwater recharge and conjunctive use programs intended to replenish Eastern San Joaquin County's

groundwater basin and promote sustainability for the future. A copy of the GBA Groundwater Management Plan is included in **Appendix F**.

Recycled water supply for the City is considered to be very consistent. Indoor water consumption by the City's customers, which does not significantly fluctuate with climatic conditions like outdoor water use, is the source of the City's recycled water supply. As such, the amount of recycled water available to the City is not expected to fluctuate in the future; indeed, as the number of water and sewer connections increase, so too will the City's recycled water supply.

As a result of the relative consistency of the City's water supplies, there are no plans at this time to *replace* any of the City's supply sources with alternative sources. The City is part of a group of Eastern San Joaquin County water users negotiating a conjunctive use project with EBMUD. Recently, however, negotiations surrounding this project have stagnated. Although this project bears the possibility of increasing the City's future water supplies, for the purposes of this UWMP this potential supply is not reflected in Table 3-5.

Chapter 7

Water Quality Impacts on Reliability

Chapter 7 Water Quality Impacts on Reliability

Water quality is an important factor in determining supply reliability; if adequate quality cannot be maintained, then the supply may be lost. In general, the City is well-equipped to handle a variety of constituents present in its supply sources that can affect water quality.

7.1 Water Quality Impacts

Pollutants from man-made sources have the potential to impact groundwater quality. Dibromochloropropane (DBCP), a commonly used fumigant and nematocide, has been identified as a potential groundwater contaminant in some of the Utility's wells. The presence of this compound, as well as other pollutants, can impact groundwater supply reliability by causing the forced shutdown of wells. The Utility has taken steps to treat affected groundwater at six wells with GAC treatment to remove DBCP. In addition, all wells are capable of providing as-needed chlorination for disinfection.

The recycled water produced by WSWPCF is considered safe for municipal irrigation by California EPA. Water quality in the Mokelumne River, the source of the City's surface water supply, is generally of very high quality.

Although the City's existing facilities are capable of producing a reliable and high quality source of water for its service area, catastrophic events such as earthquakes, major fire emergencies, water outages due to extended losses of power, localized flooding, surface water or groundwater contamination, and acts of sabotage could impact the City's ability to maintain high water quality. To prepare for such events, the City has prepared an Emergency Response Plan (ERP), which includes federal, state, and local contact directories, an emergency contractor directory, resource inventories, locations for emergency operations centers, response procedures, and the steps necessary to resume normal operations. An excerpt[4] from the plan is included in **Appendix E**.

The Utility has taken steps to address any potential water quality issues that could impact the reliability of its current and projected supply sources. There are no plans to replace or supplement these sources.

7.2 Constituents of Concern

DBCP

DBCP has been used by area farmers to kill nematodes in vineyards. DBCP was banned in California in 1977, but is still present in trace levels in some groundwater. In 2004, eleven of Lodi's wells had no detectable DBCP. Six wells are equipped with GAC to remove DBCP. The remaining wells meet State and Federal standards, but have trace amounts of DBCP. As a result, DBCP concentrations in the water served to the people of Lodi are within the level deemed safe by the U.S. EPA and the State of California.

In 1996 the City settled a lawsuit against DBCP manufacturers, who have already paid the City for a large portion of Lodi's costs related to DBCP treatment. DBCP manufacturers will continue to pay a large portion of the City's DBCP related costs for the settlement's 40-year life.

MTBE

MTBE (Methyl-Tert-Butyl-Ether) is a controversial additive to gasoline that can affect the odor and taste of drinking water. MTBE can potentially leak from service stations into the groundwater. Monitoring of City wells has not found any detected traces of MTBE to date. The City has a program of monitoring all

[4] Because the City's ERP contains sensitive information, the entire document has not been made available for public review. The document is kept on file by the City.

City wells for MTBE. Wells that are at greater risk (i.e., closer to gasoline stations) are monitored more frequently.

PCE and TCE

The City, working with regulatory agencies and potentially responsible parties in a cooperative manner, is pursuing a resolution to a groundwater contamination problem in the north and central Lodi area. None of the City's operating wells are currently out of compliance with any drinking water standards. PCE (Tetrachloroethylene) and TCE (Trichloroethylene) have been detected in samples taken in soils and groundwater. Cleanup work in portions of the area has commenced and the City expects additional areas to commence cleanup work in the near future.

Chapter 8

Wastewater and Recycled Water

Chapter 8 Wastewater and Recycled Water

8.1 Planning Requirements

Section 10633 of the California Water Code states that the plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. It also states that, to the extent available, preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area, and shall include all of the following:

- **10633 (a)** A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.
- **10633 (b)** A description of the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.
- **10633 (c)** A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.
- **10633 (d)** A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.
- **10633 (e)** The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.
- **10633 (f)** A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.
- **10633 (g)** A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

8.2 Agency Coordination

The City has not developed a recycled water planning document at this time. The City is currently in the process of developing a Recycled Water Master Plan (RWMP) for the Utility's service area. It is possible that the development of the City's RWMP may include input from other agencies or stakeholders. The basis of the anticipated RWMP is described in further detail in the subsequent sections of this chapter.

8.3 Wastewater System Description

The City owns, operates, and maintains the wastewater system that serves the community. The sewer system consists of gravity sewers up to 48 inches in diameter, pumping stations, and force mains to collect wastewater from residential and commercial customers. The wastewater is collected and discharged to trunk sewers and interceptors and conveyed to the WSWPCF, located

6 miles outside of the water service area on North Thornton Road, for treatment. Industrial wastewater from a cannery and other users is collected and conveyed separately from the residential wastewater to WSWPCF for treatment or direct irrigation. WSWPCF is currently permitted for a capacity of 7.0 million gallons per day (mgd). The average daily flow at WSWPCF for 2004-2005 was approximately 6.4 mgd. **Table 8-1** presents past, current, and projected quantities of wastewater treated at WSWPCF, as well as the quantity meeting Title 22 recycled water standards.

Table 8-1: Wastewater Collected and Treated at WSWPCF (Guidebook Table 33)

Year	2000	2005	2010	2015	2020	2025	2030
Wastewater Collected & Treated in Service Area, AFY	7,400	7,200	7,700	8,300	8,940	9,630	10,380
Quantity of Treated Wastewater Meeting Recycled Water Standards [a], AFY	0	7,200	7,700	8,300	8,940	9,630	10,380

Footnotes:

a. Recycled water currently being used for agricultural irrigation is not treated to Title 22 standards, but is considered safe for reuse in land application. The remaining effluent from WSWPCF is treated to Title 22 standards. The agricultural water receives only secondary treatment by design; WSWPCF has adequate capacity to treat all wastewater to Title 22 standards.

8.4 Wastewater Treatment Process Description

The area serviced by WSWPCF includes the incorporated area of the City of Lodi. The wastewater receives primary, secondary, and tertiary treatment though the following processes:

- Influent flow measurement;
- Influent screening;
- Grinding;
- Grit removal;
- Primary clarification;
- Aeration/sludge activation;
- Secondary clarification;
- WAS thickening;
- Anaerobic digestion of solids;
- UV disinfection;
- Granular filtration;
- Effluent flow measurement; and,
- Effluent disposal or reuse.

Industrial process water from the cannery is stored in 45 acres of existing ponds.

8.5 Wastewater Disposal

Most of the treated effluent from WSWPCF is recycled during the summer months. Currently, an average annual volume of 2,500 AF is recycled. During the winter months, all treated effluent is

discharged to White Slough, which is part of the San Joaquin Delta. Adjacent to WSWPCF, the City owns in excess of 1,000 acres of land and leases approximately 650 acres to local farmers for the cultivation and harvesting of feed and fodder crops not intended for human consumption. WSWPCF has the flexibility to irrigate with domestic flow and/or cannery process water. All of the industrial process water influent is recycled for irrigation and ponding. If a process upset should occur, the domestic flow can be stored in holding ponds and further treated before discharging water to the Delta. In recent years, the City has also supplied recycled water from the domestic treatment process to produce steam for a 49-megawatt natural gas-powered generator, and to replenish mosquito fish-rearing ponds. In addition, the City has provided a "will serve" letter to the Northern California Power Agency (NCPA) for a potential power plant that will utilize an average of 1 mgd of treated wastewater. The remaining effluent is disposed of in the Delta. With the upcoming development of a RWMP, as well as additional recycled water infrastructure, the amount of treated wastewater discharged to the Delta will likely decrease as demand for recycled water increases.

Table 8-2 presents both current and projected annual volumes for various types of wastewater disposal. The values in this table reflect the breakdown of recycled water uses presented in the City's 2000 UWMP (Table 6-1).

Table 8-2: Current and Projected Wastewater Disposal (Guidebook Table 34)

Disposal Method	Treatment Level	Volume, AFY					
		2005	2010	2015	2020	2025	2030
To Delta	Tertiary	4,700	4,080	4,680	5,320	5,710	4,960
Land Application/ Agriculture Irrigation [a]	Secondary	2,350	2,350	2,350	2,350	2,350	2,350
Municipal Landscape Irrigation [a,c]	Tertiary	< 1	< 1	< 1	< 1	300	1,800
Industrial Use [b]	Tertiary	100	1,220	1,220	1,220	1,220	1,220
Fish Pond Replenishment [a]	Tertiary	50	50	50	50	50	50
	Total	**7,200**	**7,700**	**8,300**	**8,940**	**9,630**	**10,380**

Footnotes:

a. Reflects the continuation of current uses of recycled water in the vicinity of WSWPCF.

b. After 2005, 'Industrial Use' includes 1 mgd that has been promised in a "will serve" letter from the City to NCPA for a potential power plant. It should be noted, however, that this use is not yet confirmed and therefore does not appear in Table 4-5.

c. *Without* recycled water, the City's projected supply deficits in 2025 and 2030 would be 300 AFY and 1,800 AFY, respectively. Refer to Table 3-5 and Table 4-5.

By 2025, the City's projected demands will exceed combined groundwater and surface water supplies. Any subsequent deficit will likely be met by using a portion of the available recycled water for municipal landscape irrigation. Use of the City's recycled water supply for municipal purposes is likely to occur prior to 2025, but because the City is currently in the process of developing a RWMP, explicit projections for municipal use between 2005 and 2025 have not been made at this time. For the purposes of this UWMP, therefore, the projections for recycled water use in Table 8-2 and Table 8-3 do not increase from 2005 levels until 2025, and reflect a continuation of current practices.

8.6 Current and Projected Recycled Water Use

As described above, approximately 2,500 AFY of treated wastewater is currently recycled in the vicinity of WSWPCF. The City's upcoming RWMP will identify the future uses and markets of recycled water supplies. Although the projected use of recycled water, aside from the recycling already taking place, has not been explicitly defined at this time, it is anticipated that a portion of the City's future recycled water supplies will be used for agricultural and municipal purposes, primarily landscape irrigation. This assumption is reflected throughout this UWMP. **Table 8-3** presents the minimum recycled water uses projected for the City (i.e., does not include all *potential* uses, which are presented in Table 8-4).

Table 8-3: Current and Projected Recycled Water Use (Guidebook Tables 35a and 36)

Recycled Water Use	Treatment Level	2005	2010	2015	2020	2025	2030
Agriculture Irrigation [a], AFY	Secondary	2,350	2,350	2,350	2,350	2,350	2,350
Municipal Landscape Irrigation [a,c], AFY	Tertiary	< 1	< 1	< 1	< 1	300	1,800
Industrial Use [a], AFY	Tertiary	100	1,220	1,220	1,220	1,220	1,220
Fish Pond Replenishment [a], AFY	Tertiary	50	50	50	50	50	50
	Total	**2,500**	**3,620**	**3,620**	**3,620**	**3,920**	**5,420**

Footnotes:

a. Reflects the continuation of current uses of recycled water in the vicinity of WSWPCF.
b. After 2005, 'Industrial Use' includes 1 mgd that has been promised in a "will serve" letter from the City to NCPA for a potential power plant. It should be noted, however, that this use is not yet confirmed and therefore does not appear in Table 4-5.
c. *Without* recycled water, the City's projected supply deficits in 2025 and 2030 are 300 AFY and 1,800 AFY, respectively. Refer to Table 3-5 and Table 4-5.

8.7 Potential Uses of Recycled Water

No infrastructure exists at this time to support municipal recycled water use within the City (not including WSWPCF or the area in its vicinity). Based on the recommendations in the City's upcoming RWMP, however, potential uses of recycled water within the City are expected to include:

- Agricultural irrigation;
- Urban (park and streetscape) landscape irrigation;
- Residential irrigation;
- School landscape irrigation; and,
- Dual-plumbed business/commercial developments.

Table 8-4 presents estimated annual volumes for several potential uses for recycled water within the City.

Table 8-4: Potential Uses of Recycled Water (Guidebook Table 35b)

Recycled Water Use	Treatment Level	2010	2015	2020	2025	2030
Agriculture Irrigation [a], AFY	Secondary	2,350	2,350	2,350	2,350	2,350
Municipal Landscape Irrigation [b], AFY	Tertiary	905	1,341	1,806	2,308	2,843
Industrial Use [a], AFY	Tertiary	100	1,220	1,220	1,220	1,220
Fish Pond Replenishment [a], AFY	Tertiary	50	50	50	50	50
	Total	**3,405**	**4,961**	**5,426**	**5,928**	**6,463**

Footnotes:

a. Reflects the continuation of current uses of recycled water in the vicinity of WSWPCF. In addition, 1 mgd is included after 2005 for a potential NCPA power plant.

b. Assumes:
   - 25% of the total annual water demand for all new (post-2005) SFR connections can be met by recycled water for landscape irrigation.
   - 10% of the demand for new MFR connections can be met by recycled water for landscape irrigation.
   - All new commercial/institutional connections, as well as 50% of existing connections, can meet 10% of their total water demand with recycled water.
   - All new industrial connections, as well as 75% of existing connections, can meet 5% of their total water demand with recycled water.
   - All landscape connections can meet 90% of their demand with recycled water.

At the present time, the City has not made any commitment to pursue any of the above recycled water uses; however, recycled water is considered to be an important aspect of the City's future water supplies. The City's upcoming RWMP will address the technical and economic feasibility of serving the above potential uses.

8.8 Comparison of 2000 UWMP Projections to Current Use

The City's 2000 UWMP did not present explicit projections for the future use of recycled water by the City, as no plans existed at that time to construct the necessary infrastructure. The 2000 UWMP did, however, outline recent (1999) recycled water use at that time.

8.9 Encouraging Recycled Water Use

As recycled water planning takes shape in the City's RWMP, municipal recycled water projects may be identified and pursued by the City, provided that those projects are feasible and cost-effective, and that they will provide water supply benefits to the City.

If these conditions can be met, methods to encourage municipal recycled water use can be developed to maximize project benefits. However, because no specific recycled water projects

have been identified at this time, quantifying the amount of recycled water use that might result from such methods is not possible.

As for the types of recycled water use currently taking place, the City should promote dialogue with landowners in the vicinity of WSWPCF to gauge potential demands for additional recycled water. If additional City land is leased to local farmers, the City should actively promote recycled water use by those farmers. Encouraging recycled water use in this way could increase recycled water usage.

8.10 Recycled Water Use Optimization Plan

At the present time, no recycled water use optimization plan has been developed due to the lack of recycled water infrastructure. Such a plan will likely be incorporated in the City's upcoming RWMP.

Chapter 9

Supply and Demand Comparison

Chapter 9 Supply and Demand Comparison

9.1 Supply and Demand Comparisons

Section 10635 (a) of the California Water Code states that every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the population projections within the service area of the urban water supplier.

In order to satisfy the requirements set forth in the Water Code, additional supply and demand comparisons are presented in **Table 9-1** below.

Table 9-1: Supply and Demand Comparisons (Combination of Guidebook Tables 40-57)

Year	Water Year Scenario	Demand, AFY	Supply, AFY	Surplus, AFY	Surplus as Percent of Supply	Surplus as Percent of Demand	Supply as Percent of Normal [b]
2005	*Normal*	19,800	30,500	10,700	35%	54%	100%
	Single Dry	19,800	27,500	7,700	28%	39%	90%
	Multiple Dry Year Period Starting in 2006						
	2006	19,920	28,300	8,380	30%	42%	93%
	2007	20,040	28,400	8,360	29%	42%	93%
	2008	20,160	28,500	8,340	29%	41%	93%
	2009	20,280	28,600	8,320	29%	41%	94%
	2010	20,400	28,700	8,300	29%	41%	94%
2010	*Normal*	20,400	28,700	8,300	29%	41%	94%
	Single Dry	20,400	25,700	5,300	21%	26%	84%
	Multiple Dry Year Period Starting in 2011						
	2011	20,500	28,820	8,320	29%	41%	94%
	2012	20,600	28,940	8,340	29%	40%	95%
	2013	20,700	29,060	8,360	29%	40%	95%
	2014	20,800	29,180	8,380	29%	40%	96%
	2015	20,900	29,300	8,400	29%	40%	96%
2015	*Normal*	20,900	29,300	8,400	29%	40%	96%
	Single Dry	20,900	26,300	5,400	21%	26%	86%
	Multiple Dry Year Period Starting in 2016						
	2016	21,040	29,428	8,388	29%	40%	96%
	2017	21,180	29,556	8,376	28%	40%	97%
	2018	21,320	29,684	8,364	28%	39%	97%
	2019	21,460	29,812	8,352	28%	39%	98%
	2020	21,600	29,940	8,340	28%	39%	98%

Table 9-1 (Continued)

Year	Water Year Scenario	Demand, AFY	Supply, AFY	Surplus, AFY	Surplus as Percent of Supply	Surplus as Percent of Demand	Supply as Percent of Normal [b]
2020	*Normal*	21,600	29,940	8,340	28%	39%	98%
	Single Dry	21,600	26,940	5,340	20%	25%	88%
	Multiple Dry Year Period Starting in 2021						
	2021	21,740	30,078	8,338	28%	38%	99%
	2022	21,880	30,216	8,336	28%	38%	99%
	2023	22,020	30,354	8,334	27%	38%	100%
	2024	22,160	30,492	8,332	27%	38%	100%
	2025	22,300	30,630	8,330	27%	37%	100%
2025	*Normal*	22,300	30,630	8,330	27%	37%	100%
	Single Dry	22,300	27,630	5,330	19%	24%	91%
	Multiple Dry Year Period Starting in 2026						
	2026	22,600	30,780	8,180	27%	36%	101%
	2027	22,900	30,930	8,030	26%	35%	101%
	2028	23,200	31,080	7,880	25%	34%	102%
	2029	23,500	31,230	7,730	25%	33%	102%
	2030	23,800	31,380	7,580	24%	32%	103%
2030	*Normal*	23,800	31,380	7,580	24%	32%	103%
	Single Dry	23,800	28,380	4,580	16%	19%	93%
	Multiple Dry Year Period Starting in 2031						
	2031	24,100	31,530	7,430	24%	31%	103%
	2032	24,400	31,680	7,280	23%	30%	104%
	2033	24,700	31,830	7,130	22%	29%	104%
	2034	25,000	31,980	6,980	22%	28%	105%
	2035	25,300	32,130	6,830	21%	27%	105%

Footnotes:

a. The term "Guidebook X" refers to the table in the *Guidebook to Assist Water Suppliers in the Preparation of a 2005 Urban Water Management Plan* by DWR.

b. "Normal" refers to the amount of water available during current (**FY 2005**), non-drought conditions.

9.2 Accounting for Water Production and Water Use

As the above analysis indicates, the City will have sufficient water supply to all meet existing and projected water demands. The City operates water meters at each of its 26 groundwater wells. Additionally, effluent at WSWPCF, which is expected to become a larger part of the City's future supply, is metered as it leaves the plant. Because the City has not yet begun to divert surface water from the Mokelumne River, no meters are in place to measure the amount of water diverted. However, with the possible future construction of a surface water treatment plant, additional flow metering devices could be constructed to help the City track the use of this supply. As the City becomes fully metered, water use by Utility customers will be metered for all service connection types.

Chapter 10

Water Shortage Contingency Plan

Chapter 10 Water Shortage Contingency Plan

10.1 Coordination with Other Suppliers

Section 10620 (d)(2) of the California Water Code requires that the City coordinate, to the extent practicable, preparation of its urban water shortage contingency plan with other urban water suppliers and public agencies in the area

10.2 Past, Current, and Projected Water Use (years applicable)

Section 10632 of the California Water code requires that the City address past, current, and projected water use and, to the extent records are available, breakdown of those uses on the basis of single family residential, multi-family residential, industrial, commercial, governmental, and agriculture use.

Past, current and projected water production for the City's water supply service area is described in **Chapter 4**.

10.3 Stages of Action

Section 10632 (a) of the California Water Code requires that the City develop stages of action to be undertaken in response to a water supply shortage, including up to a 50 percent reduction in water supply. The City must also identify specific water supply conditions which are applicable to each stage.

Section 10632 (f) requires that the City's urban water shortage contingency plan include penalties or charges for excessive use.

A five-stage rationing plan, including voluntary and mandatory stages, is described below. The stage determination and public declaration during a water supply shortage will be made by the Public Works Director. **Table 10-1** summarizes the triggering mechanisms for each water stage.

Stage I – Normal Conditions: The City is able to meet all immediate needs of its customers.

Stage II – Water Alert: A 5% or greater reduction in water usage is required for the City to meet the immediate needs of its customers.

Stage III – Water Warning: A 15% or greater reduction in water usage is required for the City to meet the immediate needs of its customers.

Stage IV – Water Crisis: A 30% or greater reduction in water usage is required for the City to meet the immediate needs of its customers.

Stage V – Water Emergency: A 50% or greater reduction in water usage is required for the City to meet the immediate needs of its customers.

Table 10-1: Triggering Mechanisms for Stages of Action

Stage	Water Supply Conditions	Triggering Mechanism
1	Normal conditions	No trigger; normal conditions
2	Minor shortage	Cutback in available water supply of 0 to 5%
3	Moderate shortage	Cutback in available water supply of 5 to 15%
4	Severe shortage	Cutback in available water supply of 15 to 30%
5	Critical shortage	Cutback in available water supply of 30 to 50%

The water stages are described in further detail in the sections below.

10.4 Mandatory Prohibitions, Consumption Reduction Methods, and Penalties

The prohibitions, consumption reduction methods, and penalties and charges for each of the five water supply stages are included in this section as required in California Water Code sections 10632 (d), 10632 (e), and 10632 (f), respectively.

Stage I. Normal Water Conditions

During Stage I there is no supply shortage, and no reduction in water usage is required.

All requirements of the City's Water Conservation Ordinance (see **Appendix C**), Lodi Municipal Code, Section 13.08.290, shall be in effect for Stage I as normal conditions. Lodi's water conservation program consists mainly of outdoor watering restrictions enforced by water conservation patrol staff, public education through local fairs, bill inserts, and newspaper articles, and an in-school education program. The waste of water is prohibited and defined in the Water Conservation Ordinance as:

- Failure to repair a controllable leak of water.
- Watering of lawns, flowerbeds, parking areas, tennis courts, patios, streets, or other exterior paved areas on days or times other than those outlined in Section 13.08.240 of the Water Conservation Ordinance as:
  - A. Watering Days:
    - 1. Premises having odd numbered street addresses on Wednesday, Friday, and Sunday.
    - 2. Premises having even numbered street addresses on Tuesday, Thursday, and Saturday.
  - B. Watering Hours: Any hour except that between May 1 and September 30 (inclusive) of each year watering between the hours of 10 a.m. and 6 p.m. is prohibited.
- Washing of sidewalks, driveways, parking areas, tennis courts, patios, streets, or other exterior paved areas or buildings except when required to remove any spillage of substances that may be a danger to public health or safety.
- Washing with water any motor vehicles, trailers, or movable equipment other than with a bucket and rinsing the vehicle or equipment by use of a hose for not more than three minutes.
- Use of a hose without a positive shut off nozzle.

- The excess watering of any area so that water flows into a gutter or any drainage area for a period exceeding three minutes.
- The unnecessary running of water in any residential, commercial, or industrial establishment onto the floor, pavement, ground or into any drain or drainage area, with any equipment or in any way for more than three minutes.
- Overwatering of lawns or landscapes from November 1 through February 28, or during or immediately following a rain.

Enforcement procedures and penalties for water wasting as defined in Section 13.08.250 of Lodi's Water Conservation Ordinance include:

- First Water Waste: Notification of water waste to the person at the premises of water waste by delivering an Information Sheet (included in Appendix C of Lodi's 2000 Urban Water Management Plan).
- Second Water Waste: In the event of a second waste of water within a 12 month period within 12 months of a first, the City will send a written notice to the person who receives the utility bill at the premises of water waste.
- Third Water Waste: In the event of a third waste of water within 12 months of a previous waste of water, the City will send a written notice and a $35 charge to the person who receives the utility bill for the premise of water waste.
- Fourth Water Waste: In the event of a fourth waste of water within 12 months of a previous waste of water, the City will send a written notice and a $75 charge to the person who receives the utility bill for the premises of the water waste.
- Fifth Water Waste: In the event of a fifth waste of water within 12 months of a previous waste of water, the City will send a written notice and a $150 charge to the person who receives the utility bill for the premise of the water waste. The City may also require a water meter and/or a flow restrictor to be installed at the waster's expense.

In addition to the enforcement procedures above, any person who wastes water, may also be charged with an infraction as per Sections 13.08.250 and 13.08.280 of the Water Conservation Ordinance.

Stage II. Water Alert

During Stage II of a water supply shortage, the shortage is minor, and a 5% or greater reduction in water usage is required for the City to meet the immediate needs of its customers. Water alert conditions are declared and voluntary conservation encouraged. The water shortage situation is explained to the public and voluntary water conservation is requested. The City also explains other stages and forecasts future actions.

All mandatory requirements of Stage I shall remain in effect. Existing on-going water conservation measures are continued and emphasized as necessary to alert the public of the nature of the water supply shortage. The City maintains an ongoing public information campaign consisting of distribution of literature, speaking engagements, bill inserts, and conversation messages printed in local newspapers. Educational programs in area schools are ongoing and utilized as necessary.

Enforcement procedures and penalties for water wasting will continue as described in the Lodi Water Conservation Ordinance Sections 13.08.250 and 13.08.280.

Stage III. Water Warning

During Stage III, the water supply shortage is moderate. The City aggressively continues its public information and education programs. Consumers are asked for a 15 % or greater voluntary or mandatory water use reduction.

All mandatory requirements of Stages I and II shall remain in effect. Additional requirements may include:

- Landscape irrigation restrictions shall be implemented to limit the allowable frequency of irrigation to a maximum of TWO days per week and based on the following schedule:
  1. Premises having odd numbered street addresses irrigate only on Wednesday and Sunday.
  2. Premises having even numbered street addresses irrigate only on Tuesday and Saturday.
- Businesses are not to serve water unless requested.

Enforcement procedures and penalties for water wasting will continue as described in the Lodi Water Conservation Ordinance Sections 13.08.250 and 13.08.280.

Stage IV. Water Crisis

During Stage IV of a water supply shortage, the shortage is severe, and a 30% or greater reduction in water usage is required for the City to meet the immediate needs of its customers.

All mandatory requirements of Stages I, II, and III shall remain in effect. Additional requirements may include:

- Landscape irrigation restrictions shall be implemented to limit the allowable frequency of irrigation to a maximum of ONE day per week and based on the following schedule:
  1. Premises having odd numbered street addresses irrigate only on Sunday.
  2. Premises having even numbered street addresses irrigate only on Saturday.
- No potable water from the City's system shall be used to fill or refill new swimming pools, artificial lakes, ponds, or streams until the water crisis is declared over.
- Water use for ornamental ponds and fountains is prohibited.
- Washing of automobiles and equipment shall be done on the lawn or at a commercial establishment that uses recycled or reclaimed water.
- Flushing of sewers or fire hydrants is permitted only in cases of emergency and essential operations.

A permanent water meter on existing non-metered services and/or flow restrictors on existing metered services shall be installed by the City on the service at customer's expense upon receipt of the second violation.

Stage V. Water Emergency

During Stage V of a water supply shortage, the shortage is critical, and a 50% or greater reduction in water usage is required for the City to meet the immediate needs of its customers.

All mandatory requirements of Stages I, II, III, and IV shall remain in effect. Additional requirements may include:

- Landscape irrigation shall not be allowed.
- Washing of automobiles and equipment shall be done at a commercial establishment that uses recycled or reclaimed water.
- No potable water from the City's system shall be used for construction purposes such as dust control, compaction, or trench jetting.
- Large industrial users, for example canneries and other food manufacturers, be required to reduce or cease all water use.

10.5 Minimum Supply for the Next Three Years

Section 10631 (e)(2) of the California Water Code requires that the City estimate the minimum water supply available at the end of the 12, 24, and 36 months, assuming the worst case water supply shortage.

Refer to **Table 6-3** in Section 6.4.1 for this information.

Worst Case Supply Shortage

California Water Code section 10632 (b) requires an estimate of the minimum annual water supply availability during each of the next three water years based on the driest three-year historic sequence for the agency's water supply. The City of Lodi's water supply is currently 100% groundwater. Although regional groundwater levels have been dropping, no short-term water supply problems are anticipated in the next three years.

The water supply currently available to the City[5] is 35,210 gpm, or 50.7 mgd, of groundwater from the City's wells. The annual average well production for 2004 was 15.2 mgd. Loss of water supply capacity could occur due to mechanical problems with wells, pumps, motors, etc. Preventative maintenance programs aid in minimizing the occurrence of mechanical failures. In addition, a water supply capacity loss may be caused by a change in water quality due to well contamination. Worst case water supply projections are not included in this section because distribution system mechanical failures and well contamination events are not expected and the capacity loss associated with each problem is difficult to quantify.

10.6 Catastrophic Supply Interruption Plan

The Water Code section 10632 (c) requires actions to be undertaken by the water supplier to prepare for, and implement during a catastrophic interruption of water supplies. A catastrophic event that constitutes a proclamation of a water shortage would be any event, either natural or manmade, that causes a severe shortage of water, synonymous with or with greater severity than the Stage III or Stage IV water supply shortage conditions. In response to these possibilities, the City has developed an Emergency Response Plan, which includes appropriate personnel listings, resource inventories, locations for emergency operations centers, response procedures, and the steps necessary to resume normal operations. Because the City's ERP contains sensitive information, only a portion of the document has been included in **Appendix E**.

[5] Does not include surface water or recycled water supplies, as the infrastructure necessary to delivery these supplies to City customers are not currently in place.

The City maintains a sound preventative maintenance program for its distribution system. Auxiliary generators are available and improvements to water facilities are made to minimize loss of these facilities during an earthquake or any disaster causing an electric power outage.

Additional action items that may be pursued in preparing for and responding to a catastrophic water supply interruption could include:

- Increase existing water storage;
- Obtain additional water supplies; and,
- Determine where funding for additional water supplies will come from.

10.6.1 Consumption Limits

Section 10632 (e) of the California Water Code requires that the City develop appropriate consumption limits that would apply in the most restrictive water shortage emergency. Examples of potential consumption limits include percentage reductions in water allotments, per capita allocations, an increasing block rate schedule for high usage of water, and restrictions on specific uses.

Consumption limits for the City have been laid out in the Water Conservation Ordinance, and are also discussed in Section 10.4 above.

10.7 Analysis of Revenue Impacts of Reduced Sales during Shortages

Section 10632 (g) of the California Water Code requires an analysis of the impacts of each of the actions taken for conservation and water restriction on the revenues and expenditures of the water supplier. Approximately 92% of the City's water was supplied to non-metered customers in 2004. Because the City of Lodi currently charges a flat rate to all of its residential customers and unmetered non-residential customers, revenue impacts of decreasing supply and consumer use will be minimal.

The majority of the City's water customers are charged with a flat rate. A reduction in the use of water may have a corresponding reduction in the expenditures by the City for the treatment and distribution of the water supply. Any of the aforementioned reductions in expenditures could be offset by increased costs for personnel time during the emergency, notification actions, increased meter reading, emergency equipment rental or purchase, emergency generator usage, etc.

Because no substantial financial impacts are anticipated on the revenues and expenditures of the City, no measures to overcome impacts have been developed, including financial reserves and/or rate adjustments.

10.8 Draft Ordinance and Use Monitoring

Section 10632 (h) of the California Water Code requires the inclusion of a draft water shortage contingency resolution. In the event of a water shortage emergency, the following is a draft water shortage contingency resolution to be passed by the Lodi City Council. The draft below gives the City Council's support to the Public Works Director in taking emergency actions as currently authorized in Lodi Municipal Code, Chapter 13.08, Article III, Section 13.08.290, "Emergency Water Conservation".

10.8.1 Draft Water Shortage Contingency Ordinance (Enacted as Needed)

DRAFT

City of Lodi

Resolution No._____

WHEREAS, Lodi Municipal Code, Chapter 13.08, Article III, Section 13.08.290, Emergency Water Conservation allows the Public Works Director to determine the degree of emergency and determine what additional restrictions of water use or other appropriate actions must be taken to protect the water system and the citizens of Lodi; and

WHEREAS, the City of Lodi is experiencing water shortages, therefore;

BE IT RESOLVED by the City Council of the City of Lodi that full support is given to the Public Works Director to make the appropriate recommendations which may include increased restrictions on watering days and hours, restrictions on washing vehicles, etc., restrictions on large water users, restrictions on flushing of water lines, restrictions on the filling of swimming pools, and increases in the current penalties for not complying with water conservation restrictions for the duration of the emergency, and urge full support and cooperation from the citizens of Lodi.

[Affix Official Seal Here]

Signature:_____

Name:_____

Title:_____

Clerk of City of Lodi

10.8.2 Mechanism for Determining Actual Reductions in Water Use

Section 10632 (h,i) of the California Water Code requires that the Urban Water Shortage Contingency Plan include a mechanism for determining actual reductions in water use.

For metered accounts, reductions in water use for each user can be determined based on meter readings. For unmetered accounts and the service area as a whole, reductions in water use must be determined by measuring water production at the City's well sites. Table 10-2 summarizes this information.

Table 10-2: Water Use Monitoring Mechanisms (Guidebook Table 31)[a]

Mechanism for Determining Actual Reductions	Type and Quality of Data Expected
Increased meter reading	Changes in the volumes of 1) water produced at the City's wells, surface water treatment plant[b], or WSWPCF, and 2) water delivered to individual metered service connections (in MG, mgd, etc.).

Footnotes:

a. The term "Guidebook X" refers to the table in the *Guidebook to Assist Water Suppliers in the Preparation of a 2005 Urban Water Management Plan* by DWR.

b. The City may decide to construct a surface water treatment plant in the future.

Chapter 11

Adoption and Implementation of the Urban Water Management Plan

Chapter 11 Adoption and Implementation of the UWMP

11.1 Provision of Water Supply Reliability Section to Service Area Customers

The City of Lodi does not supply water to cities or agencies other than its own customers. Therefore, the UWMP will not be distributed to other agencies except as described in Chapter 1.

11.2 Public Participation and Plan Adoption

The adoption resolution for the UWMP is found in **Appendix A**. The Draft UWMP was made available for public review between February 15 and March 1, 2006. Notices were placed on the City's website to encourage involvement from all social, cultural and economic groups. A public hearing was conducted for the Draft UWMP to allow public review and comment. Proof of the public hearing, as well as an overview of the comments received, is located in **Appendix B**.

11.3 Review of 2000 UWMP

The City has continued to implement the management programs and recommendations discussed in the 2000 UWMP. The main provisions in the 2001 UWMP were 1) to develop a conjunctive use program to reduce the City's overall pumping of groundwater, 2) to reassess the feasibility of partially meeting water demands through use of recycled water, 3) to continue with current conservation efforts and to consider implementation of additional cost effective measures, 4) to track development of new drinking water standards as they pertain to the City's water supplies, 5) to maintain groundwater supply capacity, and 6) to establish a process to assess the effectiveness of conservation measures.

11.4 Provision of 2005 UWMP to Local Government

Water Code Section 10644 requires that the City provide a copy of this UWMP to all cities and counties within which the City provides water. Therefore, this UWMP will be sent to San Joaquin County as described in **Section 1.4**.

11.5 Public Review

This document was made available for public review as described in **Section 1.5**.

References

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8. City of Lodi, "Emergency Response Plan," June, 2004.
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10. City of Lodi, "City of Lodi General Plan," December, 1989.
11. City of Lodi, "City of Lodi Urban Water Management Plan," March, 2001.
12. City of Lodi, "City of Lodi Water Master Plan," September, 1990.
13. City of Lodi, "City of Lodi Wastewater Master Plan," January, 2001.
14. City of Lodi, City Website, September, 2005.
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17. Geomatrix Consultants Inc., "DRAFT Technical Memorandum: Phase I Remedial Investigation Lodi Northern Plume Area." January, 2006.
18. Northeastern San Joaquin County Groundwater Banking Authority, "Eastern San Joaquin Groundwater Basin Groundwater Management Plan," June, 2004.
19. Northeastern San Joaquin County Groundwater Banking Authority, "System Plan Components Inventory," April, 2002.
20. Schlumberger Water Services, "Surface Water Supply Options," September, 2004.
21. Schlumberger Water Services, "Water Availability Assessment, Lodi Southwest Gateway Annexation," April, 2005.
22. Schlumberger Water Services, "Water Availability Assessment, Lodi Westside Annexation," August, 2005.
23. Western Regional Climate Center, City of Lodi Climate Data, October 2005.
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filed 2-7-06

City of Lodi

2005 Urban Water Management Plan

February 7, 2005

Presenter:
Glenn Hermanson

Background

- Urban Water Management Plans (UWMP) are required by the Urban Water Management Planning Act (AB 797). Originally passed in 1983 and since then amended 18 times.
- As an urban water supplier providing more than 3,000 acre-feet per year (AFY), Lodi must prepare and submit an UWMP to the Dept. of Water Resources (DWR) every five years.
- UWMPs are meant to assist and encourage integrated regional water planning, and are a prerequisite for State water grant funding.

Background

- The UWMP may be used as a foundation for Water Supply Assessments (SB 610) and Written Verifications of Water Supply (SB 221), which are required for new development.
- DWR is responsible for deeming UWMPs "complete," and has distributed a guidebook to assist water suppliers that are preparing them.

Primary Goals of Lodi's 2005 UWMP

- Create a functional document for Lodi's long-term water planning
- Adequately address all DWR requirements

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Chapter 11: Adoption & Implementation of the UWMP

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Chapter 1: Introduction

Coordination with Other Agencies

- Coordination with appropriate agencies is required by DWR and prudent for regional planning:
  - Northeastern San Joaquin County Groundwater Banking Authority
  - San Joaquin County
  - California Department of Health Services

Chapter 1: Introduction

Public Participation

- Public participation is required by DWR and encouraged by Lodi:
  - Public hearing (scheduled for February 15, 2006)
  - Two week public review period, starting the day of the public hearing

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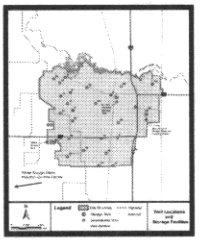
Chapter 2: Supplier Service Area

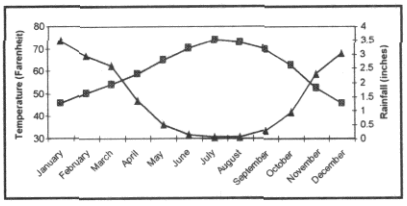
Description of Service Area

- Current population is approximately 62,500
- Service area covers about twelve square miles
- White Slough Water Pollution Control Facility (WSWPCF) located 6 miles to the southwest



Chapter 2: Supplier Service Area

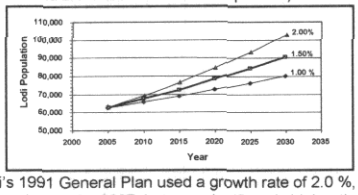
Climate

- High temperatures and dry weather mean that Lodi's peak demands occur during the summer
- 

Chapter 2: Supplier Service Area

Population

- A population growth rate of 1.5% was assumed for the UWMP (rates of 1.0% and 2.0% are shown for comparison)



- Lodi's 1991 General Plan used a growth rate of 2.0 %, resulting in a projection for 2007 that was significantly higher than what will likely be achieved.

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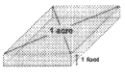
Chapter 3: Water Supply

Current Water Supply - **Groundwater**

- Groundwater is currently the sole supply source used in Lodi In 2005, Lodi used approximately 17,300 acre-feet (AF) of groundwater.
- 

1 AF per year (AFY) is roughly the amount of water used by a household of 3.5 people.
- Groundwater levels in Lodi are decreasing at a rate of about 5 inches per year.

Chapter 3: Water Supply

Current Water Supply – **Surface Water**

- Lodi recently signed a contract with Woodbridge Irrigation District (WID) to purchase 6,000 AFY from the Mokelumne River for 40 years.
- This supply has yet to be utilized. Lodi is in the process of determining when, where, and what kind of infrastructure will be required to utilize this new supply.

Chapter 3: Water Supply

Current Water Supply – **Recycled Water**

- The source of Lodi's recycled water is the treated effluent from WSWPCF.
- Approximately 2,500 AFY is currently recycled near WSWPCF. The remaining effluent is discharged to the Delta.
- Substantial infrastructure will be required to utilize additional recycled water supply.

Chapter 3: Water Supply

Future Water Supply – **Groundwater**

- Based on recent investigations, Lodi's sustainable yield is 15,000 AFY.

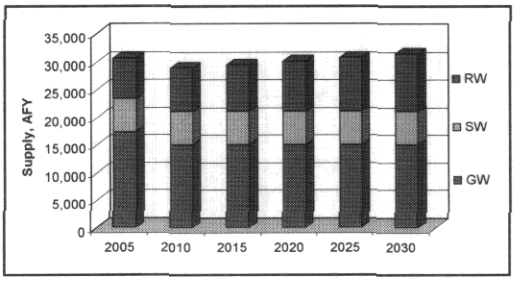
Future Water Supply – **Surface Water**

- 6,000 AFY will be available during the remainder of Lodi's 40-year contract with WID.

Future Water Supply – **Recycled Water**

- Available recycled water will grow from 7,200 AFY in 2005 to approximately 10,380 AFY in 2030.

Chapter 3: Water Supply



Chapter 3: Water Supply

Why is treated wastewater considered a recycled water supply?

- Wastewater is "real" water .
- Lodi's WSWPCF provides filtration and advanced disinfection. Effluent of this quality meets all State and federal regulations for recycling.
- Lodi's Recycled Water Master Plan will clearly define the distribution and application of recycled water in the future.

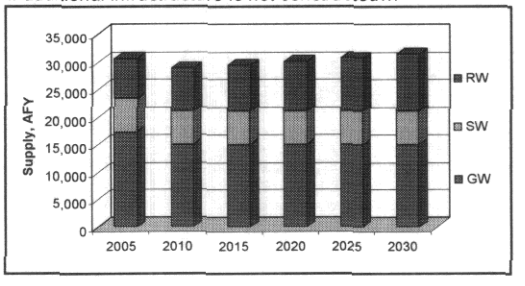
Chapter 3: Water Supply

Differences between UWMP Supplies and 'Reality'

- *Although the supplies shown in the UWMP are "real,"* Lodi lacks the infrastructure to distribute surface water and recycled water to its customers.
- If the additional infrastructure is not constructed, Lodi's supply picture looks much different…

Chapter 3: Water Supply

If additional infrastructure is not constructed…



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Chapter 4: Water Demand

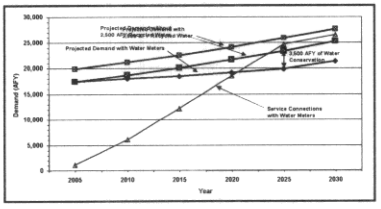
Current Water Demand

- Municipal demand for 2005 was 17,300 AF. The majority of this water is used for irrigation during the summer months.
- A recycled water demand of 2,500 AFY is included in the UWMP. This demand effectively reduces the amount of recycled water available to Lodi for municipal purposes, and is therefore considered a demand by DWR.

Chapter 4: Water Demand

Future Water Demand

- Lodi will begin metering residential connections in the near future, and expects to realize a 15% reduction in demand



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Chapter 5: Demand Management Measures

- DWR requires that 14 Demand Management Measures (DMMs) are addressed in the UWMP.
- For each DMM that Lodi currently implements, a description of Lodi's current practices is provided, including costs and estimated water savings.
- For each DMM that Lodi does not currently implement, a cost effectiveness summary has been provided.

Chapter 5: Demand Management Measures

Summary of Lodi's DMMs:

DMM	Description	Implemented
1	Water Survey Programs for Single Family and Multi-Family Residential Customers	No; B/C Ratio = 0.9
2	Residential Plumbing Retrofit	Yes
3	System Water Audits, Leak Detection and Repair	Yes
4	Metering with Commodity Rates for all New Connections and Retrofit of Existing Connections	In Process
5	Large Landscape Conservation Programs and Incentives	No; B/C Ratio = 5.6
6	High Efficiency-Washing Machine Rebate Programs	No; B/C Ratio = 0.7
7	Public Information Programs	Yes
8	School Education Programs	Yes
9	Conservation Programs for Commercial, Industrial, and Institutional (CII) Accounts	No; B/C Ratio = 2.2
10	Wholesale Agency Programs	Not applicable
11	Conservation Pricing	In Process
12	Water Conservation Coordinator	Yes
13	Water Waste Prohibitions	Yes
14	Residential Ultra-Low Flush Toilet Replacement Program	Yes

*B/C = Benefit-to-Cost Ratio

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Chapter 6: Water Supply Reliability

- Of Lodi's ground, surface, and recycled water supplies, only the 6,000 AFY of surface water is considered susceptible to climatic conditions.
- WID can legally reduce Lodi's deliveries by 50% during dry years, but no further.
- Although groundwater levels are declining in general, fluctuations due to drought are typically insignificant.
- Recycled water is derived primarily from indoor water usage, which does not vary significantly during dry weather.

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Chapter 7: Water Quality Impacts on Reliability

Groundwater

- Lodi's wells are equipped to provide emergency disinfection. Several locations provide filtration to remove DBCP.

Surface Water

- Water from the Mokelumne River is generally of very high quality.

Recycled Water

- Recycled water from WSWPCF meets stringent State and federal regulations for municipal reuse.

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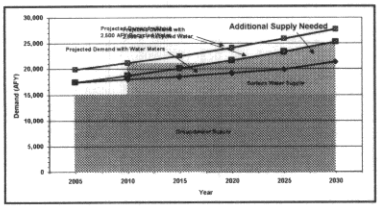
Chapter 8: Wastewater & Recycled Water

- WSWPCF currently treats about 7,200 AFY of municipal and industrial wastewater. The treatment process includes filtration and disinfection, making the treated effluent suitable for industrial and municipal reuse.
- Approximately 2,500 AFY of water is currently recycled near WSWPCF. This demand is expected continue in the future.

Chapter 8: Wastewater & Recycled Water

- It is estimated that by 2025, water demand will exceed current ground and surface water supplies. Lodi may need to rely on a portion of its recycled water supplies to meet the additional demands.



Chapter 8: Wastewater & Recycled Water

- The UWMP identifies potential recycled water uses within the City of Lodi. Lodi's upcoming Recycled Water Master Plan will provide a detailed analysis of these potential demands.
- Lodi fully intends to utilize recycled water prior to 2025.

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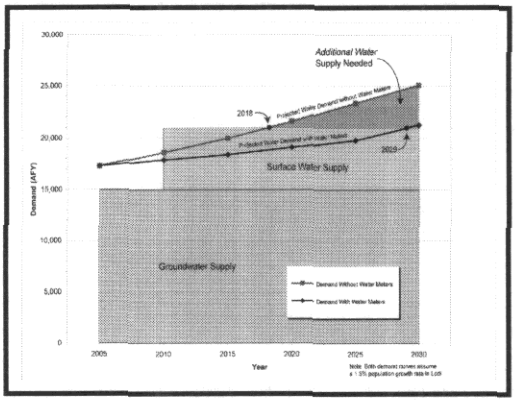
Chapter 9: Supply & Demand Comparison

- The UWMP compares projected supplies during normal, single dry and multiple dry years with projected demands over a 25-year horizon.
- Based on current projections, and with the use of recycled water supplies, Lodi will have sufficient water to meet all existing and future demands.



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Chapter 10: Water Shortage Contingency Plan

- Lodi's Water Shortage Contingency Plan was developed to prepare for and respond to possible future water shortages. The Plan consists of five stages of action:

Stage I	Normal Conditions
Stage II	Water Alert
Stage III	Water Warning
Stage IV	Water Crisis
Stage V	Water Emergency

- *Possible catastrophic interruptions to supplies are* addressed in Lodi's Emergency Response Plan.

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Chapter 11: Adoption & Implementation of the UWMP

- Lodi's UWMP will be finalized following a two week public review period, currently scheduled from February 15 to March 1, 2006.
- Upon completion, the UWMP will be furnished to San Joaquin County, Northeastern San Joaquin County Groundwater Banking Authority, and the California Dept. of Health Services.

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Appendices

The following appendices are provided with the UWMP:

- Adoption Resolution
- Public Participation Information
- Conservation & Education Information
- WID Contract
- Excerpt from the Emergency Response Plan
- SJ County Groundwater Management Plan
- Water Balance Calculations for Lodi's Safe Yield Estimation

Questions?