

TABLE OF CONTENTS

	Page
1. INTRODUCTION.....	1-1
1.1 Individuals Involved in Water Plan Development	1-1
1.2 Previous Water Planning in the Region.....	1-2
1.3 Contents of the Water Plan	1-2
2. DOCUMENTATION OF PUBLIC INVOLVEMENT IN PLANNING PROCESS.....	2-1
2.1. Interstate Stream Commission-Sponsored Water Workshops	2-1
2.2. Background Summary of Region Prepared for Public Dissemination	2-1
2.3. List of Stakeholders and Participants	2-1
3. STRATEGY CHOSEN TO MAXIMIZE PUBLIC INVOLVEMENT.....	3-1
3.1. Use of the Media	3-1
3.2. Press Releases	3-1
3.3. Outreach Effort Tailored to Specific Communities	3-1
3.4. Project Time Table	3-1
3.5. Public Meetings.....	3-2
4. BACKGROUND INFORMATION.....	4-1
4.1 Description of the Region.....	4-1
4.1.1 Location and Boundaries.....	4-1
4.1.2 Geography and Landscape	4-1
4.1.3 Climate	4-2
4.1.4 Natural Resources.....	4-4
4.1.5 Major Surface Water and Ground water Sources	4-4
4.1.6 Demographics	4-5
4.1.7 Economic Picture.....	4-6
4.1.8 Land Ownership and Land Use	4-6
4.2 Historical Overview of Water Use in Region	4-7
4.3 NMOSE Water Use Record.....	4-9
5. LEGAL ISSUES.....	5-1
5.1 Introduction	5-1
5.2 Federal Legal Issues Impacting the Supply of and Demand for Water in Lea County	5-1
5.2.1 Impact of Federal Water Quality Standards on the Supply of and Demand for Water in Lea County	5-1
5.2.2 The Pecos River Compact and Texas v. New Mexico.....	5-5
5.2.2.1 Impact of The Pecos River Compact and Texas v. New Mexico (1983) on the Supply of and Demand for Water in Lea County	5-2
5.3 State Legal Issues Impacting the Supply of and Demand for Water in Lea County	5-3
5.3.1 Surface Water	5-3
5.3.2 Ground-Water.....	5-3
5.3.2.1 State Statutes Affecting Ground-water in Lea County	5-3
5.3.2.2 State Regulatory Policies Affecting Ground-water in Lea County	5-4
5.3.2.2.1 Declared Ground-water Basin Criteria – Lea County Underground-water Basin	5-4
5.3.2.2.2 Declared Ground-water Basin Criteria – Capitan Underground-water Basin	5-4
5.3.2.2.3 Declared Ground-water Basin Criteria – Jal Underground-water Basin.....	5-5
5.3.2.2.4 Declared Ground-water Basin Criteria – Carlsbad Underground-water Basin	5-5
5.3.2.2.5 Declared Ground-water Basin Criteria – Roswell Underground-water Basin	5-5

5.3.2.3	State Case Law Affecting Ground-water Lea County – Mathers v. Texaco, Inc. – 1996	5-5
5.3.2.4	Impact of State Statutes, Regulatroy Policies and Case Law on the Supply and Demand on Ground-water in Declared Undergound Water Basins in Lea County.....	5-5
5.3.2.5	Pending adjudications Affecting Gound-water in Lea County	5-6
5.3.3	Leagal Issues Needing Resolution	5-6
5.4	Local Conflicts.....	5-6
5.4.1	Oil Production Ground-water Contamination	5-6
5.4.2	Ground-water Drawdown.....	5-6
5.4.3	Out of County Use.....	5-7
5.4.4	Special Districts.....	5-7
6.	WATER-RESOURCES ASSESSMENT FOR THE WATER PLAN STUDY AREA	6-1
6.1	Water Supply.....	6-1
6.1.1	Surface Water	6-1
6.1.1.1	Precipitation Data.....	6-1
6.1.1.2	Drainage Basins and Watersheds	6-2
6.1.1.3	Streamflow Data	6-4
6.1.1.4	Evaporation Data	6-4
6.1.1.5	Surface Water Yields	6-5
6.1.2	Ground Water.....	6-5
6.1.2.1	Geologic Data	6-5
6.1.2.2	Hydrogeology Data by Aquifer	6-7
6.2	Water-Quality Issues.....	6-16
6.2.1	Assess Quality of Water Sources	6-16
6.2.2	Identify Sources of Water Contamination	6-21
6.2.2.1	Petroleum Production Facilities	6-23
6.2.2.2	Agricultural Activities.....	6-26
6.2.2.3	Liquid Waste Disposal Systems.....	6-26
6.2.2.4	Underground Storage Tanks.....	6-30
6.2.2.5	Mines and Quarries.....	6-30
6.2.2.6	Industrial Facilities	6-30
6.2.2.7	Landfills.....	6-31
6.2.2.8	Livestock Industry	6-32
6.2.2.9	Radioactive Mineralization	6-32
7.	WATER DEMAND.....	7-1
7.1	Present Uses.....	7-1
Type, Location, and Ownership of Water Rights	7-1	
Water Rights by Category of Use	7-3	
7.1.2.1	Public Water Supply.....	7-3
7.1.2.2	Domestic.....	7-4
7.1.2.3	Irrigated Agriculture.....	7-4
7.1.2.4	Livestock.....	7-5
7.1.2.5	Commercial.....	7-6
7.1.2.6	Industrial	7-6
7.1.2.7	Mining	7-6
7.1.2.8	Power	7-6
7.1.3	Water Diversions by Category of Use.....	7-6
7.1.3.1	Public Water Supply.....	7-6
7.1.3.2	Domestic.....	7-9
7.1.3.3	Irrigated Agriculture.....	7-10

7.1.3.4	Livestock.....	7-11
7.1.3.5	Stockpond and Playa Lake Evaporation	7-12
7.1.3.6	Commercial.....	7-12
7.1.3.7	Industrial	7-13
7.1.3.8	Mining	7-14
7.1.3.9	Power.....	7-14
7.1.3.10	Reservoir Evaporation	7-15
7.1.3.11	Fish, Wildlife, and Recreation	7-15
7.1.4	Water Depletions by Category of Use	7-15
7.1.4.1	Public Water Supply.....	7-16
7.1.4.2	Domestic.....	7-16
7.1.4.3	Irrigated Agriculture.....	7-16
7.1.4.4	Livestock.....	7-17
7.1.4.5	Commercial.....	7-17
7.1.4.6	Industrial	7-17
7.1.4.7	Mining	7-17
7.1.4.8	Power.....	7-17
7.1.4.9	Reservoir Evaporation	7-18
7.1.4.10	Fish, Wildlife, and Recreation	7-18
7.1.5	Public Water-Supply Systems by Community.....	7-18
7.1.6	Irrigation Practices	7-20
7.1.7	Conveyance losses	7-20
7.1.8	Return Flows	7-20
7.2	Future Water Uses by 40 Year Planning Horizon	7-21
7.2.1	Projected Future Demographics	7-21
7.2.1.1	Population.....	7-21
7.2.1.2	Future Land Use	7-21
7.2.1.3	Economic Growth and Jobs	7-22
Projected Water Demands By Category Of Use	7-22	
7.2.2.1	Irrigated Agriculture.....	7-23
7.2.2.2	Mining	7-23
7.2.2.3	Public Water Supply.....	7-24
7.2.2.4	Domestic.....	7-24
7.2.2.5	Livestock.....	7-24
7.2.2.6	Commercial.....	7-24
7.2.2.7	Recreation	7-24
Projected Changes in Water Supplies in Region.....	7-24	
7.3	Summary of Present and Future Water Demand	7-25
8.	WATER PLAN ALTERNATIVES	8-1
8.1	Water Plan Alternatives.....	8-1
8.1.1	Irrigated Agriculture	8.1
8.1.1.2	Municipal & Industrial.....	8-2
8.1.2	Ground-Water Flow Modeling.....	8-5
8.1.2.1	Development of Deep Aquifers	8-5
8.1.2.2	Treatment of Lower Quality Water	8-5
8.1.2.3	Importing Water	8-7
8.1.2.4	Aquifer Recharge.....	8-7
8.1.2.5	Cloud Seeding	8-7
8.1.3	Water Management	8-7
8.1.3.1	Interstate Alternatives	8-7

8.1.3.2 State Involvement	8-7
8.1.3.3 County-Wide Programs.....	8-8
8.1.3.4 Municipal Management.....	8-9
8.2 Alternative Evaluations	8-12
8.2.1 Conservation Alternatives.....	8-12
8.2.2 Development Alternatives.....	8-13
8.2.2.1 Deep Aquifers	8-14
8.2.2.2 Treatment of Lower Quality Water	8-14
8.2.2.3 Importing Water	8-15
8.2.2.4 Aquifer Recharge	8-16
8.2.2.5 Cloud Seeding	8-17
8.2.3 Management Alternatives.....	8-19
8.2.3.1 Interstate Alternatives	8-19
8.2.3.2 State Involvement	8-20
8.2.3.3 County Management.....	8-20
8.2.3.4 Municipal.....	8-21
8.3 Sample Implementation Schedule	8-24
8.4 Drought Management Plan	8-24
References and Bibliography.....	

TABLES

	Page
TABLE 4-1 Summary of Characteristics of the Primary Soils in Each Soil Association in Lea County	4-3
TABLE 4-2 Lea County Historical Population.....	4-6
TABLE 4-3 Historical Development of Water Use in Lea County.....	4-8
TABLE 4-4 Lea County Historical Water Use: 1975-7998 (acre-feet)	4-10
TABLE 6-1 Lea County Climate Recording Stations.....	6-1
TABLE 6-2 Lea County Average Precipitation	6-2
TABLE 6-3 Alluvial Aquifer.....	6-8
TABLE 6-4 Flow Across.....	6-11
TABLE 6-5 Ogallala Aquifer – Stored Water in Lea County.....	6-12
TABLE 6-6 Lea County Aquifers – Ground-Water in Storage	6-14
TABLE 6-7 SC & TDS of Water in Select Lea County Aquifers	6-16
TABLE 6-8 Naturally Occurring Gross Alpha Concentrations for Public Supply Wells in Lea County	6-18
TABLE 6-9 Oglala Aquifer Water Quality	6-19
TABLE 6-10 Capitan Aquifer Quality.....	6-21
TABLE 6-11 Sites Investigated Under CERCLA in Lea County.....	6-23
TABLE 6-12 Petroleum Production Contamination	6-25
TABLE 6-13 Nitrate Concentrations.....	6-27
TABLE 6-14 Lea County Nitrate Contamination Cases	6-28
TABLE 6-15 Hobbs WWTP Monitoring Well Data.....	6-29
TABLE 6-16 Lea County Industrial Facilities Causing Contamination.....	6-31
TABLE 6-17 Lea County Landfills	6-32
TABLE 6-18 Gross Alpha Concentrations in Lea County PWSs.....	6-33
TABLE 7-1 Water Rights for Public Water Systems in Lea County.....	7-2
TABLE 7-2 Summary of Lea County Water Rights	7-3
TABLE 7-3 Summary of Water Rights for Lea County UWBS.....	7-5
TABLE 7-4 1995 and 1998 Diversion Summary for Lea County.....	7-7
TABLE 7-5 1995 and 1998 Public Water Supply Diversions in Lea County.....	7-8
TABLE 7-6 Hobbs Water distribution	7-9

TABLE 7-7 Lovington Water Distribution	7-9
TABLE 7-8 Eunice Water Distribution	7-9
TABLE 7-9 1998 Domestic Water Diversions in Lea County	7-10
TABLE 7-10 1995 Irrigates Agricultural Diversions and Total Project Depletions in Lea County	7-10
TABLE 7-11 Irrigated Acres, Irrigable Acreage & Irrigation Diversions in Lea County.....	7-11
TABLE 7-12 1995 diversions and Depletions for Livestock Use in Lea County	7-1
TABLE 7-13 Playa Lake & Stockpond Evaporation Depletions in Lea County	7-12
TABLE 7-14 1995 Commercial diversion and Depletions in Lea County	7-12
TABLE 7-15 1995 Industrial Diversions and Depletions in Lea County	7-13
TABLE 7-16 Top 15 Mining Diversions in Lea County (1995).....	7-14
TABLE 7-17 1995 Mining Diversions (By Subcategory) in Lea County.....	7-14
TABLE 7-18 1995 Power Diversions and Depletions in Lea County.....	7-15
TABLE 7-19 Reservoir Evaporation Diversions in Lea County	7-15
TABLE 7-20 Fish, Wildlife, and Recreation Diversions in Lea County	7-15
TABLE 7-21 1995 Depletions in Lea County	7-16
TABLE 7-22 1995 Depletions for Public Water Supply in Lea County	7-16
TABLE 7-23 1995 Domestic Depletions in Lea County.....	7-16
TABLE 7-24 1995 Consumptive Irrigation Requirements for Lea County	7-17
TABLE 7-25 1995 Incidental On-Farm Depletions in Lea County	7-17
TABLE 7-26 Top 15 Mining Depletions in Lea County (1995)	7-18
TABLE 7-27 Reservoir Evaporation Depletions in Lea County	7-18
TABLE 7-28 1995 Fish, Wildlife, and Recreation Depletions in Lea County	7-18
TABLE 7-29 Major Public Water Suppliers in Lea County	7-19
TABLE 7-30 1995 and 1998 Public Water System Consumption in Lea County	7-19
TABLE 7-31 1995 Return Flows for Lea County (By Use Category).....	7-20
TABLE 7-32 1995 Irrigated Agricultural Return Flows in Lea County	7-20
TABLE 7-33 1995 Non-Irrigation Return Flows in Lea County.....	7-21
TABLE 7-34 Population Projections for Lea County	7-21
TABLE 7-35 Lea County Water Use in 2040 (with current CRP Acreage Remaining Fallow)	7-23
TABLE 7-36 Lea County Projected Water Use in 2040 (with current CRP Acreage Returning)	7-23

TABLE 8-1 Water Conservation Measures	8-1
TABLE 8-2 Inclining-Block Rate Structure	8-3
TABLE 8-3 Water Monitoring Program	8-11
TABLE 8-4 Evaluation of Water Conservation alternatives.....	8-13
TABLE 8-5 Evaluation of Water Development Alternatives	8-18
TABLE 8-6 Evaluation of Water Management Alternatives.....	8-23
TABLE 8-7 Drought Plan Phase	8-25
TABLE 8-8 Drought management Plan Outline	8-26
TABLE 8-9 Recommended Action Level Determining Factors	8-26
TABLE 8-10 Recommended Actions	8-27

FIGURES

- Figure 1. Lea County Water Plan Planning Region.
- Figure 2A. Geologic history map, Lea County, New Mexico
- Figure 2B. Surface water drainage basins, Lea County, New Mexico.
- Figure 3. General soil map, Lea County, New Mexico.
- Figure 4. Underground water basins in the region, Lea County, New Mexico.
- Figure 5. Land ownership in the region, Lea County, New Mexico.
- Figure 6. Land use in the region, Lea County, New Mexico.
- Figure 7. Plot showing temperature and precipitation versus elevation, Lea County, New Mexico.
- Figure 8. Map showing the base of the Ogallala Formation, Lea County, New Mexico.
- Figure 9. Map showing location of the Capitan aquifer and Delaware Basin within southeastern New Mexico.
- Figure 10. Geologic map of Lea County, New Mexico.
- Figure 11. Geologic cross-section A-A' and B-B', Lea County, New Mexico.
- Figure 12. Geologic cross-section C-C', Lea County, New Mexico.
- Figure 13. Geologic cross-section D-D', Lea County, New Mexico.
- Figure 14. Geologic cross-sections E-E', F-F' and G-G', Jal Underground Water Basin, Lea County, New Mexico.
- Figure 15. Map showing potentiometric surface elevation contours in Tertiary-age or Quaternary-age rocks and Triassic aquifers, 1952, Lea County, New Mexico.
- Figure 16. Map showing water level changes, January 1940 to January 1950 in east-central Lea County, New Mexico.
- Figure 17. Map showing water level changes, January 1950 to January 1960 in east-central Lea County, New Mexico.
- Figure 18. Map showing potentiometric surface elevation contours, 1968, Lea County, New Mexico.
- Figure 19. Map showing potentiometric surface elevation contours, 1981, Lea County, New Mexico.
- Figure 20. Map showing water level changes, 1968 to 1981, Lea County, New Mexico.
- Figure 21. Map showing potentiometric surface elevation contours, 1995-1998, Lea County, New Mexico.

- Figure 22. Map showing water level changes, 1981 to 1998, Lea County, New Mexico.
- Figure 23. Map showing depth to water, 1968, Lea County, New Mexico.
- Figure 24. Map showing depth to water, 1981, Lea County, New Mexico.
- Figure 25. Map showing depth to water, 1995-1998, Lea County, New Mexico.
- Figure 26. Map showing approximate saturated thickness of the Ogallala Formation, 1952, northern Lea County, New Mexico.
- Figure 27. Map showing approximate saturated thickness of the Ogallala Formation, 1967, Lea County, New Mexico.
- Figure 28. Map showing approximate saturated thickness of the Ogallala Formation, 1995-1998, Lea County, New Mexico.
- Figure 29. Map showing changes in specific conductance, 1948-1958, Lea County, New Mexico.
- Figure 30. Map showing specific conductance, mid 1980s, Lea County, New Mexico.
- Figure 31. Map showing specific conductance, 1995-1998, Lea County, New Mexico.
- Figure 32. Map showing changes in specific conductance, 1948-1958, Lea County, New Mexico.
- Figure 32. Map showing changes in specific conductance, mid 1980s to 1998, Lea County, New Mexico.
- Figure 33. Map showing areas of known potential sources of contamination, Lea County, New Mexico.
- Figure 34. Map showing known ground-water contamination sites, sewage treatment plant, and miscellaneous monitor wells in the Hobbs area, Lea County, New Mexico.
- Figure 35. Population Characteristics, Lea County, New Mexico, 1940-2040.
- Figure 36. Total Annual Water Use 1975-2040, Lea County, New Mexico.
- Figure 37. Irrigated Agricultural Water Use 1975-2040, Lea County, New Mexico.
- Figure 38. Mining and Power Water Use 1975-2040, Lea County, New Mexico.
- Figure 39. Public Supply and Domestic Water Use 1975-2040, Lea County, New Mexico.
- Figure 40. Livestock Water Use 1975-2040, Lea County, New Mexico.
- Figure 41. Commercial Water Use 1975-2040, Lea County, New Mexico.
- Figure 42. Industrial Water Use 1975-2040, Lea County, New Mexico.
- Figure 43. Historical Annual Precipitation 1975-1998, Hobbs and Tatum, New Mexico.

APPENDICES

- Appendix A. Minutes of Public Meetings
- Appendix B. Minutes of Steering Committee Meetings
- Appendix C. Public Involvement Data
- Appendix D. Geologic Time Scale and Stratigraphic Nomenclature Chart
- Appendix E. Textural Guide for Soil Classifications
- Appendix F. Lea County List, Endangered, Threatened, and Candidate Species of Concern and List of Migratory Birds Protected by the Migratory Bird Treaty Act
- Appendix G. Climate Data for Lea County
- Appendix H. New Mexico Well Numbering System
- Appendix I. Spring Data for Lea County and Peak Flow Data for Monument and Antelope Draws
- Appendix J. Hydrographs within Lea County
- Appendix K. Federal and New Mexico Water Quality Standards
- Appendix L. Resource Conservation and Recovery Information System (RCRIS) Sites in Lea County
- Appendix M. New Mexico Environment Department (NMED) Ground Water Quality Bureau Database of Ground-water Contamination Sites Reported in Lea County Since 1986
- Appendix N. Analytical Results of Select Public Water Supply and Monitor Wells in Lea County
- Appendix O. Conservation Division (OCD) Information Regarding Petroleum Production Activity Contaminated Sites in Lea County
- Appendix P. Public Water Systems in Lea County listed by the Environmental Protection Agency (EPA) and New Mexico Environment Department (NMED)
- Appendix Q. Water Rights Information Regarding Public Water Supply Systems in Lea County and Len Stokes' Water Rights Abstract Summarizing Lea County Underground Water Basin (UWB) Rights Owned Outside of Lea County
- Appendix R. Detailed Procedure to Calculate the Consumptive Irrigation Requirement (CIR) and Other Irrigated Agriculture Information
- Appendix S. New Mexico Drought Plan
- Appendix T. Information Related to the Dairy Industry in Lea County
- Appendix U. Information Regarding Mines, Mills, Pits and Quarries in Lea County
- Appendix V. Information Related to Water Use by Major Public Water Suppliers in Lea County