DOCUMENTATION OF THE LEA COUNTY UNDERGROUND WATER BASIN GUIDELINES FOR THE REVIEW OF WATER RIGHT APPLICATIONS

Prepared by
Thomas D. Morrison, P.E.

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NOTE

This report was prepared by a private consultant retained by the Office of the State Engineer (OSE). The statements provided herein should not be interpreted as representing official guidelines. Parties should be aware that the OSE will process water right applications using the interpretations, standards, and methods deemed most appropriate at the time of application evaluation. These methods may be different from those presented in this report.

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INTRODUCTION

The Office of the State Engineer (OSE) has adopted administrative guidelines for the Lea County Underground Water Basin (LCUWB) for water right application processing. The basin is bounded on the east by the Texas-New Mexico border, on the west by the Roswell Artesian Basin, on the north by the Causey Lingo Basin, and on the south by the Capitan Underground Water Basin (Figure 1). The LCUWB is limited to the northern two-thirds of Lea County. The guidelines have been designed for applications proposing diversions from the High Plains aquifer, the primary source of water supply for the LCUWB.

The procedures apply to the processing of groundwater applications filed on or after September 16, 2009, the adoption date of the guidelines. Pending applications filed prior to this date will be evaluated on a case-by-case basis. The guidelines do not apply to the processing of applications filed under NMSA Section 72-12-1.1, 72-12-1.2, and 72-12-1.3. Appendix A summarizes the applications processed recently.

The guidelines follow the methods recently adopted for other basins while addressing the unique conditions in Lea County. Input from the Lea County Water Users Association (LCWUA) was considered during the development of the guidelines.

Use of the guideline restrictions should render reasonable decisions, but flexibility in applying the restrictions may be required in some instances for sound decision-making. For those guidelines which provide a general framework for the review of water right applications, the word “may” is used since case-by-case considerations are appropriate. In general, the word “shall” is used in the guidelines to reaffirm state engineer orders, regulations, and statutory requirements.

WATER RIGHTS ADMINISTRATION

The LCUWB was declared by the OSE on August 21, 1931 and was closed to further appropriations of water for irrigation purposes on December 29, 1948. Investigations thereafter demonstrated that some additional appropriations of water could be permitted within the boundaries of the declared basin, and that substantial quantities of water could also be developed outside the declared boundaries of the basin. As a result of these studies the LCUWB was extended on October 1, 1952, and reopened in part to new appropriations on December 29, 1952. The basin was extended further on September 23, 2005. The High Plains aquifer within the LCUWB was temporarily closed to new appropriations filed under NMSA Section 72-12-3 on March 10, 2009, and closed for an indefinite time period to such appropriations on September 14, 2009.

Summary of the 1952 Procedures

The original administrative practices developed in 1952 recognized that it was not practical to operate the basin on a sustained yield basis. Early on, well withdrawals exceeded annual recharge and it was recognized that the amount of water in storage was very large compared to recharge. To allow economic growth, the OSE developed a "mined basin approach" which allowed the aquifer to be de-watered to a certain level by the end of the 40-year planning period (1992).

A block administrative system was employed where the basin was divided into blocks corresponding to a township and range. No permits were granted to appropriate water in a block unless one-third or more of the original storage was available at the end of the 40-year period. This period is used in a number of basins to allow a water supply of a sufficient duration for the repayment of real estate loans, and for 40-year planning entities.

Summary of the September 16, 2009 Administrative Guidelines

The 2009 guidelines apply a one-square mile block system with each block corresponding to a cell in the LCUWB groundwater flow model (Figure 2). As a cross-section, the top of the cell represents the water level while the base represents the top of the underlying bedrock. A 40-year planning period beginning on January 1, 2005 and ending on January 1, 2045 is selected for block administration. The year 2005 was selected as this was shortly after the time guideline development began.

The guidelines provide a framework on the process to evaluate groundwater right applications but do not define impairment. Drawdown limits and aquifer thickness requirements for well production are provided in the guidelines and serve as suggested benchmarks for weighing well impacts. The benchmarks are appropriate for average basin-wide conditions and may not be appropriate for a given application after site characteristics are taken into account. Impairment determinations are made by the State Engineer on a case-by-case basis.

Drawdown limits and allowances are selected based on water availability considerations. Limits are applied to control the rate of drawdown for areas with a 40-year minimum supply, while allowances define those relatively small effects that may be allowed in areas predicted to have less than a 40-year supply. Supply calculations are made by evaluating effects due to the full exercise of existing water rights.

The saturated thickness necessary for a 40-year supply is determined by examining the minimum aquifer thickness[1] necessary for non-domestic well operation. For relatively thin aquifers, non-domestic wells are selected since they require a longer water column due to the larger yields required relative to domestic wells. The average drawdown observed or estimated during pumping and the necessary water columns for pump operation are summed to obtain the minimum saturated thickness for well operation. Our analysis indicates that at least 55.0 feet of saturation is necessary in the LCUWB for non-

[1] The aquifer thickness, rather than water columns, was used for this analysis since it is a common practice in the LCUWB to complete wells to the base of the aquifer.

domestic well operation. Blocks with an estimated saturated thickness of 55.0 feet or less by 2045 are designated a Critical Management Area (CMA).

Calculations to estimate the saturated thickness in 2045 were made by applying the OSE groundwater flow model developed for the basin to simulate the full exercise of water rights contained in the WATERS database. Since WATERS is only partially complete for the LCUWB, a second method was used to identify additional CMAs by subtracting the nodal values of historical drawdown from the existing saturated thickness for each cell based on Tillery (2008). This method increased the model derived CMA distribution. The CMAs derived from both methods are provided in Figure 3.

The drawdown allowance for the CMA is selected by assessing the water availability of the LCUWB in relation to other similar basins where allowable drawdowns have been established. The Estancia Basin was selected due to basin similarities and the availability of information. Based on the 0.10 ft/yr allowance selected for the Estancia Basin, and water availability comparisons, the LCUWB allowable rate of decline should be about 22 percent of the Estancia Basin allowance. A value of 0.025 ft/yr was selected as the allowable rate of decline for the CMAs (Table 1).

Table 1. Estancia Basin and Lea County Basin water availability comparison

BASIN	BASIN WATER RIGHTS[2] (af/yr)	Q RECENT WITHDRAWAL[3] (af/yr)	GROUNDWATER IN STORAGE[4] (af)	STORAGE/ WITHDRAWAL (yrs)	PERCENT OF ESTANCIA VALUE
ESTANCIA	183,800	59,100	42,018,270	815	100 %
LEA COUNTY	440,000	176,400	31,100,000	176	22 %

In addition to restricting declines within the CMA, a drawdown limit is also required to administer the areas outside the CMA (non-CMA). The LCWUA recommends a drawdown limit of 8 feet over 40 years, or 0.20 ft/yr. This value is supported based on our independent analysis using average basin wide conditions.

The restrictions discussed above are illustrated in Figure 4.

In addition to using more stringent drawdown restrictions, the CMA designation also places a cap on withdrawals within these areas by preventing changes in point of

[2] From WATERS at time of model development
[3] DBS&A, 2009, Table 6-3, Draft Report
[4] Shomaker, 2002, Draft Report

diversion from outside the CMA into the CMA. Other types of transfers as listed below may be allowed if statutory requirements are met:

- Change point of diversion from the CMA to outside the CMA.
- Change point of diversion where the move-from and move-to sites are outside the CMA.
- Change point of diversion where the move-from and move-to sites are within the same group of contiguous CMA cells.
- Change place or purpose of use throughout the basin regardless of CMA designation.

Figure 5 provides some examples where an application is filed to change the point of diversion from one cell to another. A portion of the model grid showing CMAs and non-CMAs is provided. The direction of the arrows illustrates the direction in which the water rights are being moved. Red arrows represent transfers that may not be permitted and the blue arrows represent transfers that may be allowed. The validity of the move-from right, conservation, public welfare, and the effects to the nearby wells in the vicinity of the move-to well must also be considered before a final decision is rendered.

Applications to change the point of diversion are simulated by "turning-off" the move-from well and "turning-on" the move-to well.[5] The distance between the move-from and move-to well is one of the primary characteristics of an application that influence the ability to meet the drawdown restrictions. Applications proposing to change point of diversion over short distances are more likely to meet the drawdown restrictions compared to long-distance transfers. Long-distance transfers create a new cone (larger net effects) of depression, while short distance transfers tend to shift the existing cone (smaller net effects).

Although the use of average conditions for block administration provides an efficient approach to weigh the impacts of drawdown over a large area, and define areas of relative restriction, it may not adequately address the impacts to nearby wells where drawdowns will be the greatest. A determination of whether drawdowns are excessive is made by taking the 40-year predicted aquifer thickness and comparing this value to the aquifer thickness required for well production for each nearby well. These evaluations are referred to as "local assessments" and are used to assess applications proposing diversions from any geologic formation within the basin. Block procedures in the guidelines are only applicable to applications proposing production from the High Plains aquifer.

The restrictions for block and local assessments are summarized in Table B.1 of Appendix B.

[5] To perform the simulation, the move-from stress is modeled as a positive flux and the move-to as a negative value.

HYDROGEOLOGIC SETTING

The primary source of water in the LCUWB is ground water from the unconfined High Plains aquifer, which is composed of late Tertiary age rocks of the Ogallala Formation, re-worked Ogallala sediments, and more recent valley-fill deposits. For administrative purposes in Lea County, the Cretaceous age rocks, which are in hydrologic communication with the Ogallala, are assumed to be a part of the High Plains aquifer. The High Plains aquifer includes mostly unconsolidated deposits of clay, silt, fine to coarse-grained sand, and gravel. Hydraulic conductivities vary within the aquifer because of stratification, irregular mixing of sediments, and differences in cementation.

The current saturated thickness ranges from zero to about 200 feet with depths to water varying between 25 to 300 feet below land surface (Tillery, 2008). Groundwater diversions have led to mining of the High Plains aquifer in Texas and New Mexico. Prior to well pumping, groundwater flow was generally in a southeasterly direction towards the state of Texas. Intensive pumping has shifted the direction of groundwater flow in the vicinity of some of the major pumping centers. Due to this shift, flows from New Mexico to Texas have declined over the past 50 years (Musharrafieh and Chudnoff, 1999).

Irrigated agriculture continues to be the major water use in the county comprising about 73 percent of the 185,952 acre-feet per year (af/yr) diverted in 2005 (Longworth and others, 2008). The total diversion in 2005 represents about 42 percent of the permitted or declared water rights within the basin, which are about 440,000 acre-feet per year.[6]

Groundwater recharge to the High Plains aquifer occurs primarily by direct infiltration of areal precipitation and infiltration of runoff into playas and arroyos. Basin recharge is about 63,000 af/yr (Musharrafieh and Chudnoff, 1999).

Natural discharge occurs through evapotranspiration where the water table is close to the land surface, and through surface evaporation from lakes and playas where these intercept the water table. In general, discharge in the area through evapotranspiration is of limited extent, and is associated with areas of shallow water table. Subsurface flow into Texas is the largest component of natural discharge from the High Plains aquifer in New Mexico.

Water-level data obtained from the U. S. Geological Survey's (USGS) Ground Water Site Inventory (GWSI) database were analyzed to determine historical trends. Water levels have declined as much as 97 feet along the state-line (Tillery, 2008). Water level decline data are summarized in Table 2.

[6] Water right totals are based on WATERS.

Table 2. Summary of water-level data, Lea County Basin

Period (number of years)	Number of wells with water-level data for each period indicating			Maximum decline over the period (feet)	Average decline (feet)	Maximum annual decline rate (ft/yr)	Average annual decline rates (ft/yr)
	Decline	Rise	Total				
1951-2000 (50)	50	2	52	72.30	35.11	1.45	0.70
1996-2000 (5)	136	22	158	25.92	4.15	5.18	0.83
2004-2007 (3)	NA	NA	209	21.2	2.4	7.06	0.80

Other geologic formations such as the Triassic rocks underlie the High Plains aquifer and may be saturated. The rocks consist primarily of consolidated shale, mudstone, siltstone, and fine-grained sandstone. These rocks are less permeable and where saturated contain groundwater with a significantly higher total dissolved solid (TDS) content compared to the overlying High Plains aquifer. Generally, the Triassic Chinle Group provides a distinctive red bed (mudstone and siltstone) that delineates the bottom boundary or base of the High Plains aquifer. The High Plains aquifer is absent where topographic highs of red bed units outcrop at the surface.

WELL CONSTRUCTION CHARACTERISTICS

Well construction information was evaluated to obtain the lowest non-pumping water level necessary for production. Available information suggests that many non-domestic wells drilled in the past ten years have been completed to the base of the High Plains aquifer. Requests for well deepening are also common. Based on these considerations, and recommendations from the LCWUA, the non-pumping level will be related to the base of the aquifer. The alternative is to determine the minimum non-pumping water level in relation to average well depths but this approach is better suited for thicker aquifers.

Aquifer test and water level data were analyzed to obtain an average dynamic drawdown, or self-induced drawdown, of 30 feet, which represents the average observed drawdown during large capacity well operation. About 25 feet of water column may be required to maintain a net positive suction head, allow enough room for the length of the pump, and provide a space above the base of the well to avoid sediment problems.

The minimum non-pumping water level for well operations is obtained by adding the dynamic drawdown to the column necessary for pump operation. A value of 55.0 feet above the base of the aquifer is obtained (Figure 6). This value represents the saturated thickness to distinguish the CMAs from non-CMAs.

For cases in the LCUWB where wells are completed in formations other than the High Plains aquifer, the comparison of drawdown to the aquifer thickness may be an unrealistic scale to judge the degree of impact on existing wells. In general, this situation

arises where completion to the base of the aquifer is not practical due to a large saturated thickness, in areas where the geology is complex and/or the aquifer thickness is unknown, and in cases where the water bearing properties vary significantly along the water column. Drawdowns are usually compared to the water column of a well for these situations.

GROUNDWATER FLOW MODEL

Musharrafieh and Chudnoff (1999) developed a finite-difference numerical model of the High Plains aquifer for the LCUWB (Figure 2). The model simulates the aquifer using a one-layer, uniform grid with one square mile per model cell. The grid extends eastward across the state line to simulate the impacts of groundwater pumping in Texas upon New Mexico. The model was calibrated to steady state and transient conditions between 1948 and 1996.

A superposition model has been developed and is often preferable for water rights administration purposes due to its ease of use. Starting heads are set to zero and the depth to the base of the aquifer is entered for the bottom elevation of the layer.

WATERS was used to obtain an approximation of the amount of water diverted due to the full exercise of non-domestic water rights. For domestic well diversions under NMSA Section 72-12-1, a diversion of 0.50 af/yr per well was assumed. A total diversion of about 440,000 af/yr was used in the predictive scenario.

Predicted drawdowns vary depending upon the hydraulic conductivity, saturated thickness, specific yield, and the pumping rate. Simulations were run by Ghassan Musharrafieh (OSE Hydrology Bureau) to provide estimated effects for a range of diversion amounts in different hydraulic conductivity (K) zones. Results are presented in Table 3.

Table 3. Forty-year drawdowns calculated by the OSE Lea County superposition model.

K-zone range (feet/day)	Model cell (row, column)	Saturated thickness (feet)	Pumping stress (acre-feet per year)				
			50	100	200	400	800
			Drawdown at 40 years (feet)				
1 – 20	20,12	98.2	2.90	5.90	12.06	25.90	69.64
21 – 40	36,18	154.3	0.62	1.25	2.51	5.05	10.27
41 – 60	29,28	200.4	0.36	0.72	1.44	2.88	5.80
61 – 80	34,42	187.1	0.29	0.57	1.15	2.31	4.64
81 – 100	38,44	187.3	0.24	0.48	0.95	1.91	3.84

RECOMMENDED PROCEDURES

Additional information on selected procedures is provided below and follows the format used in the guidelines.[7]

I. GENERAL PROCEDURES

Section I.A, New appropriations: This section of the guidelines requires that all applications filed under NMSA Section 72-12-3 to appropriate water in the LCUWB from the High Plains aquifer be rejected, unless they were filed before March 10, 2009. Applications filed under NMSA Section 72-12-3 to appropriate ground water in the LCUWB from formations other than the High Plains aquifer may be considered.

The High Plains aquifer is at present the only known dependable water source in the LCUWB and the potential for other aquifers to meet demands is unknown at this time. Model projections indicate significant water level declines in developed areas. Current levels of water use significantly exceed aquifer recharge. The High Plains aquifer within the LCUWB was temporarily closed to new appropriations filed under NMSA Section 72-12-3 on March 10, 2009 and closed for an indefinite time period on September 14, 2009. This action conforms to the recommendations provided in the Lea County Regional Water Plan (Leedshill-Herkenhoff, Inc., 2000, page 8-8).

The finding of no unappropriated ground water in the High Plains aquifer in LCUWB will not affect the ability to obtain domestic well permits under NMSA Section 72-12-1.1, 72-12-1.2 and 72-12-1.3. In addition to these wells, other permits for change location of well, replacement wells, and supplemental wells (NMSA Sections 72-12-7, 72-12-22 and 72-12-23, and 72-12-24, respectively) may be obtained if statutory requirements are met.

Other geologic formations present in the basin generally are less permeable than the High Plains aquifer but may serve as limited sources of supply. Pending or new applications filed under NMSA Section 72-12-3 to appropriate water from these formations will be evaluated on a case-by-case basis. The OSE may require that the impacts due to these wells be confined to the deeper bedrock formations.

Applications filed before March 10, 2009 will be evaluated on a case-by-case basis.

Section I.B, Critical management area: Under the guidelines, model cells within the LCUWB are designated a CMA if the saturated thickness is estimated to be 55.0 feet or less by the year 2045 (Figure 4). Model calculations to estimate the aquifer

[7]The statements provided in this report should not be interpreted as representing official guidelines. The OSE will process water right applications using the interpretations, standards, and methods deemed most appropriate at the time of application evaluation. These methods may be different from those presented in this report.

thickness have been made by assuming the water rights in WATERS are used to their full permitted or declared amount, up to year 2045. Since WATERS is currently incomplete for Lea County, CMA designations have also been made by subtracting the observed historical water level declines from the current saturated thickness for each cell using information presented in Tillery (2008). This method assumes that the declines observed in the past will continue to occur at the same rate for the next 40 years. Figure 3 provides the composite CMA distribution at the time of guideline adoption which may be revised after September 16, 2014 and thereafter as required.

The saturated thickness of 55.0 feet represents an average value that is based on drawdown data and the water column necessary for pump operation. Aquifer test and water level data were analyzed to obtain an average dynamic drawdown, or self-induced drawdown, of 30 feet. About 25 feet of water column is assumed to be required to maintain a net positive suction head, allow enough room for the length of the pump, and provide a space above the base of the well to avoid sediment problems. The minimum non-pumping water level for well operations is obtained by adding the dynamic drawdown to the column necessary for pump operation (Figure 6).

In response to public concerns relating to the potential frequency that the CMA boundaries could be modified, the State Engineer has decided to maintain the existing CMA distribution for at least five years following the adoption date of the guidelines. Applications processed within this time period which are predicted to reduce the saturated thickness in a cell to 55.0 feet may be limited to a drawdown of up to 0.20 feet per year times the number of years in the simulation period. After five years, the OSE may modify the CMA boundaries as applications are processed or as new information becomes available.

> <u>EXAMPLE</u>
> An application is proposed in a cell that has a predicted 2045 saturated thickness of 56.0 feet. The assessment is performed in 2012 (simulation period is 33 yrs). The allowable drawdown for block administration is 0.20 ft/yr x 33 yrs = 6.6 feet. If the application was approved, the OSE could designate the cell a CMA on or after September 16, 2014.

Section I.C, Declaration and permit limits: General provisions for determining available transfer amounts are provided for all uses. Unless water rights are adjudicated, licensed, or fall under the provisions on NMSA Section 72-1-9 or 72-12-8; the quantity of water available for transfer is limited to the quantity placed to beneficial use.

Section I.D, Water right transfers: The values that were historically applied for transfers involving irrigation rights are adopted. Other values may be used if they can be justified by the applicant and accepted by the OSE.

Section I.E, Water quality: Water quality assessments will be performed on a case-by-case basis as required. These assessments may be performed if there is a concern that a proposed appropriation may affect the water quality in nearby wells. Water quality information is provided in Appendix C.

Section I.F, Metering requirements: Metering may be required for wells permitted under NMSA 72-12-1.1, 72-12-1.2 or 72-12-1.3. All new permits for all other types of wells will be conditioned to require metering. If a supplemental or replacement well is added to an existing well field, all wells in the field are required by the guidelines to be metered.

Section I.G, Five-year accounting period: Five-year accounting allows the annual diversion to vary if the total five-year amount does not exceed five times the annual diversion amount. Implementation of five-year accounting by OSE in Lea County will require resources that are not presently available. Additional staffing, metering, and other resources are required before five-year accounting may be initiated. Five-year accounting is not presently available but may be initiated in the future. The guideline details how five-year accounting will be administered when and if implemented. This guideline was included at the request of the LCWUA.

Section I.H, Conservation of water: A determination of whether a proposed appropriation is contrary to the conservation of water within the state is made by assessing the highest and best technology available and economically feasible. The assessments are performed on a case-by-case basis. Staff may request assistance from the OSE Water Use and Conservation Bureau.

Section I.I, Supplemental wells: The guidelines recommend that the applicant provide a pumping schedule at the time of supplemental well application submittal. A pumping schedule specifies how the diversion will change over time for each well and is useful to estimate potential well impacts more accurately. If a schedule is not provided the OSE may return the application for additional information or assume a pumping distribution.

The capacity of the existing permitted wells may be taken into consideration in selecting the appropriate pumping distribution. Other possible scenarios include, but are not limited to, a worst case where the proposed supplemental well produces the majority of the diversion or a distribution where diversions are assigned equally to each well.

Section I.J, Return flow plan: A permit is required under the guidelines in order to increase a diversion based on return flow credit. If an application for return flow credit is filed, it shall include a return flow plan containing meter readings demonstrating flows returned directly to the source aquifer. Return flow credit will not be granted for leakage or seepage associated with the following: irrigation operations; re-use of effluent water; dairy operations; water and wastewater lines; and ponds, septic tanks, or leach fields.

Return flow credit may only be considered for constructed works specifically designed to return water to the production aquifer.

Section I.K, Calculation methods: In addition to the instructions provided in the guidelines, additional information is offered. To perform block assessments, where cells remain saturated, a baseline scenario is simulated where all existing water rights are fully

exercised to January 1, 2045.[8] A second simulation is performed by modifying the baseline well file to include the move-to pumping and reduction of pumping at the move-from site as proposed in the application.[9] The cessation of pumping at the move-from site is simulated by a positive flux in the amount of the transfer while a negative flux is used to simulate pumping at the move-to site. Pumping is initiated in the year the calculations are performed. The difference between the two runs provides the net drawdown. Rates of water level decline are computed by dividing the net drawdown by the number of years in the simulation period. The remaining saturated thickness is obtained by finding the difference between the 2045 levels and the depth to the aquifer base.

Local assessments may be performed by applying the Theis equation or numerical model. The location of existing wells in relation to the proposed well may be considered in making the model selection. Drawdowns at the end 40-years due to existing wells[10], the proposed well and self-induced impacts of the affected well are summed to obtain the total drawdown. The total drawdown may be subtracted from the existing saturated thickness at the affected well sites to obtain the remaining saturated thickness at the end of 40 years.

II. REGIONAL ASSESSMENT PROCEDURES

Section II.A.1, New appropriations in areas outside the CMA: This section of the guidelines requires applications filed under NMSA Section 72-12-3 to appropriate water from outside the CMA to be rejected.[11]

NMSA Section 72-12-3 applications proposing diversions in the LCUWB entirely from formations other than the High Plains aquifer may be considered. The degree of hydrologic connection between the formation and the High Plains aquifer should be evaluated to determine if a new appropriation may be allowed. The OSE may wish to condition permits to require well completion in accordance with artesian well specifications.

Section II.A.2, Transfers to the non-CMA: Under the guidelines, applications to change point of diversion between sites within the non-CMA will be considered along with applications to change point of diversion from a CMA to non-CMA (Figure 5, transfer from E to F, and C to D, respectively). Applications to change place or purpose of use will also be considered throughout the basin regardless of CMA designation.

Section II.A.3, Drawdown limit for wells proposed in areas outside the CMA: Unless other guidelines are more restrictive, an application may be permitted under the

[8] For transfers which impact dry cells, the move-from and move-to wells may be simulated without existing water rights if appropriate.
[9] For supplemental wells, the existing and proposed pumping distributions are simulated.
[10] The numerical model may be used to estimate future effects due to the exercise of existing water rights. Available water level decline data may also be taken into consideration in certain cases. These cases may include, but not limited to, situations where existing water level declines exceed the model results.
[11] Section 72-12-3 applications filed before March 10, 2009 will be evaluated on a case-by-case basis.

guidelines to induce drawdowns up to 0.20 feet per year times the number of years in the simulation period on cells outside the CMA, until the saturated thickness drops to 55.0 feet. The simulation period starts in January of the year in which the calculations are performed to January 2045.

> EXAMPLE
> An application is proposed in a cell that has a predicted 2045 saturated thickness of 80 feet. The assessment is performed in year 2020 (simulation period of 25 yrs). The drawdown outside of the CMA that may be allowed for the application is 0.20 ft/yr x 25 yrs = 5.0 feet. Other impacts also need consideration such as impacts on the CMA and nearby wells. The most restrictive provision may provide the basis for decision making.

A drawdown limit of 8.0 feet over 40 years, or 0.20 ft/yr, was recommended by the LCWUA. The OSE finds this rate acceptable based on the evaluation that follows.

The average water column for wells producing from areas outside of the CMA is expected to be greater compared to the basin-wide average of 84 feet. A water column of 90 feet is assumed for the calculations. Water level declines have averaged 0.70 feet per year to 0.83 feet per year, depending upon the time period assessed. A rate of decline of 0.70 feet per year is assumed. Applying these values provides an average water column of 62.0 feet after 40 years (90.0 ft – (0.70 ft/yr x 40 yrs) = 62.0 ft). If a saturated interval of about 55.0 feet is required for the operation of non-domestic wells in Lea County, proposed wells may be allowed to induce a drawdown up to 7.0 feet (62.0 ft – 55.0 ft = 7.0 ft). Considering the assumptions used in this analysis, a limit of 8.0 feet appears to be in the right range.

A water level decline limit of this nature is typically presented as a rate of decline rather than a total drawdown by the end of the 40-year planning period. The use of a total drawdown will result in a greater rate of drawdown as the 40-year planning period proceeds. For example, if an application is filed in year 2035, and is allowed a total drawdown of 8 feet over 10 years (0.80 ft/yr), this equates to three times the allowable rate if the application was evaluated in year 2015 (8 ft over of 30 yrs or 0.27 ft/yr). The use of the same rate of decline is more equitable and is consistent with the methods used in other basin guidelines.

Calculations were performed by Ghassan Musharrafieh (OSE Hydrology Bureau) to assess the pumping stresses necessary to remain below the 8-foot over 40 years (0.20 ft/yr) limit within a pumping cell. The results of these test runs are presented in Table 4 for general illustration only; caution should be exercised when generalizing from them. For some cases, it may be possible to divert up to 800 af/yr, while remaining below the 8-foot over 40-year guideline. Applications will also be subject to local area and CMA drawdown limits. The results in Table 4 vary depending upon the hydraulic conductivity (K) zone examined and the year in which calculations are performed.

Table 4. Forty-year drawdowns on non-CMA cells calculated by the OSE Lea County superposition model. Drawdowns exceeding the 8-foot limit are shown in bold. All simulations assumed a specific yield of approximately 0.22 to 0.25.

K-zone range (feet/day)	Model cell (row, column)	Saturated thickness (feet)	Pumping stress (acre-feet per year)				
			50	100	200	400	800
			Drawdown at 40 years (feet)				
1 – 20	20,12	98.2	2.90	5.90	**12.06**	**25.90**	**69.64**
21 – 40	36,18	154.3	0.62	1.25	2.51	5.05	**10.27**
41 – 60	29,28	200.4	0.36	0.72	1.44	2.88	5.80
61 – 80	34,42	187.1	0.29	0.57	1.15	2.31	4.64
81 – 100	38,44	187.3	0.24	0.48	0.95	1.91	3.84

Section II.A.4, Drawdown allowance on cells becoming a CMA: Unless other guidelines are more restrictive, applications, in conjunction with the full exercise of existing rights provided in WATERS, may have a combined effect of reducing the saturated thickness in a cell to 55.0 feet by the year 2045. If the saturated thickness is reduced to this limit, the cell may be considered a CMA and the application may be permitted a drawdown allowance up to 0.025 ft/yr times the number of years remaining in the simulation period, unless the application is processed by September 16, 2009. Applications processed by September 16, 2014 may be allowed to induce a drawdown up to 0.20 ft/yr during the simulation period regardless of the saturated thickness.

> EXAMPLE
> A water rights transfer is proposed where the move-to well will be located in a cell that has a predicted 2045 saturated thickness of 58 feet. The assessment is performed in 2020 (simulation period of 25 yrs). Model predictions indicate the saturated thickness will drop to 55.0 feet in year 2040 (in 20 yrs) and decline further by 2045. The allowable net drawdown is 4.125 ft. ((0.20 ft/yr x 20 yrs) + (0.025 ft/yr x 5 yrs) = 4.125 ft.)
>
> EXAMPLE
> The same example above but the application is evaluated in 2012. The allowable net drawdown is 6.6 ft ((2045-2012) x 0.20 ft/yr = 6.6 ft)

Transfers within the non-CMA, or within the CMA, may result in additional water level declines on CMA cells. Prohibiting any level of additional drawdown on the CMAs is not practical as this will result in the denial of all applications, including those causing infinitesimal declines. To address this potential problem basin guidelines include an administrative drawdown allowance, which may be selected by considering the allowances for other basins (Table 5) and the unique characteristics of each area.

Table 5. Statewide Administrative Drawdown Allowances on CMAs

BASIN	Drawdown Allowance (ft/yr)
Tularosa	0.05
Roswell	0.05
Estancia	0.10

The basins listed in Table 5 have multiple aquifers and/or a significant saturated thickness compared to the LCUWB. It follows that the allowable drawdown for the LCUWB should be lower. Information on the volume of water in storage and current levels of water use for the LCUWB and Estancia Basin were compared (Table 1). A drawdown allowance of about 22 percent of the allowable drawdown for the Estancia Basin is supported from this comparison. An allowable average rate of water level decline up to 0.025 ft/yr (1 foot over 40-years) is selected for the LCUWB.

Section II.A.5, Drawdown allowance on existing CMA cells: Under the guidelines, proposed wells may impact water levels within the CMA up to 0.025 ft/yr times the number of years in the simulation, unless the cumulative effects become excessive or other guidelines are more restrictive.

Cumulative effects may pose a potential problem if multiple applications are approved in the same area. The OSE may apply a drawdown allowance as deemed appropriate if the cumulative effects become excessive.

Table 4 indicates that appropriations between 100 and 200 af/yr may be possible using the 0.025 ft/yr allowance for certain areas under a 40-year simulation (1 foot drawdown). The offsets of turning off the move-from well are not considered. With respect to the regional drawdown restrictions, any amount could be transferred if the move-from and move-to well were within the same cell and the diversions were equal.[12]

Section II.A.6, Unsaturated cells: Impacts associated with unsaturated cells or areas outside the active portion of the model will be assessed on a case-by-case basis. A relatively small number of cells are predicted by the model to become dry within 40 years if water rights are fully exercised (Figure 3).

Local assessments are typically relied upon for applications involving dry cells. The Theis equation may be applied to perform a local assessment with the appropriate transmissivity to assess effects on nearby wells. A saturated thickness of 10 feet may be used to compute the transmissivity unless other values are more reasonable. A local assessment allowance of 1.0 foot in 40 years, or other appropriate value, may be applied.

A regional assessment may also be performed if calculations are made appropriately.
Once a cell becomes unsaturated drawdowns associated with the cell cannot be computed with the numerical model**.** Simulations with the OSE numerical model may be performed by computing the net effects of the transfer without the full exercise of existing rights.

[12] Applications must also meet other statutory requirements.

This approach should maintain saturated conditions so the model may be applied. A net effect allowance of 0.025 ft/yr, or other appropriate value, may be applied to perform a regional assessment. Local assessments may also be processed using a numerical model.

Section II.B.1, New appropriations within a CMA: Under the guidelines, applications filed under NMSA Section 72-12-3 shall be rejected for proposed appropriations from a CMA.[13] NMSA Section 72-12-3 applications proposing diversions entirely from formations other than the High Plains aquifer may be considered.

This guideline is the same as Section II.A.1 except it pertains to proposed Section 72-12-3 wells located within a CMA.

Section II.B.2, Transfers from non-CMA to CMA: The guidelines require the rejection of applications to change point of diversion from a non-CMA to a CMA (Figure 5, change point of diversion from A to B), but the OSE may consider special circumstances. Decision-making authority within OSE as to the circumstances of a specific case is assigned jointly to the Director of Water Rights and Chief of the Hydrology Bureau to promote administrative consistency statewide.

One method to prolong the life of the CMAs is to reject applications to transfer water rights into these areas. This guideline places a cap on additional well diversions to prolong the water supply and prevent impairment within these marginal areas.

At the request of the LCWUA, the statement that the OSE may consider special circumstances was included. Special circumstances may include, but not limited to, transfers over a very short distance where net depletions are minimal.

Applications to change place or purpose of use from a non-CMA to CMA will be considered since these will not increase appropriations from the CMA.

Section II.B.3, Transfers within a CMA: Under the guidelines, applications to change point of diversion within a CMA are generally limited to transfers within contiguous CMA cells (Figure 5, transfer from G to H and I to J) but the OSE may consider special circumstances. Decision-making authority within OSE as to the circumstances of a specific case is assigned jointly to the Director of Water Rights and Chief of the Hydrology Bureau to promote administrative consistency statewide.

A CMA may include a single cell surrounded by non-CMA cells or a contiguous group of CMA cells. Limiting a change in point of diversion to within a group of cells is intended to prevent in effect a "new appropriation" in another group of CMA cells. At the request of the LCWUA, flexibility in applying the guideline is provided. Applications to change place or purpose of use, without a change in point of diversion, are not limited to a contiguous group of CMA cells.

[13] Applications filed before March 10, 2009 will be evaluated on a case-by-case basis.

Section II.B.4, Drawdown allowance on existing CMAs: This section of the guidelines allows a proposed groundwater diversion to induce drawdowns up to 0.025 ft/yr times the number of years in the simulation period on any saturated CMA cell unless the cumulative effects become excessive.

An explanation of this guideline is provided in Section II.A.4. Section II.A.4 pertains to cells that meet the provisions to become a CMA due to the use of a proposed well. Section II.B.4 pertains to cases where cells are already designated a CMA prior to the consideration of an application. The same allowance is provided for both situations.

Section II.B.5, Supplemental wells bounding a CMA: The guidelines provide that if a permittee owns a primary or supplemental well within the non-CMA, which abuts a CMA, an application filed by the permittee for a supplemental well within that CMA may be considered.

This guideline is designed to address those cases where impacts are minimal. The Director of Water Rights and the Chief of the Hydrology Bureau are responsible for these decisions.

Section II.B.6, Transfers from wet to dry CMA cells: Applications to change point of diversion from a saturated CMA cell to an unsaturated cell, or vice versa, will be processed on a case-by-case basis**.** Although a cell is classified as "dry" according to the model calculations, the cell may contain water locally. Information on transfers involving dry cells is provided above in Section II.A.6.

Section II.C, Administrative model: The OSE numerical model (superposition version) developed by Musharrafieh and Chudnoff (1999), or other subsequent model version selected by the OSE, may be used to compute impacts for block administration. A superposition model computes the net drawdowns rather than water table elevations and is easier to apply. Water levels at the start of a simulation in the superposition version are set to zero and depths to the aquifer base are used to define the saturated thickness.

The well-input files should be updated following application approval with the exception of wells permitted under NMSA Section 72-12-1.1, 72-12-1.2, and 72-12-1.3 (domestic well diversions may be included as deemed necessary). As applications are approved, or updates to WATERS are made, the Water Rights Division should forward this information to the OSE Hydrology Bureau so the well files are up to date.

It has been the practice of the OSE that model revisions by the OSE Hydrology Bureau may be made at any time without guideline revision.

Section II.D, Calculations: This section provides information on cell selection and other calculation details. In addition to this information, the procedures are also outlined in Section I.K and Section II.A.6 of this report. Additional information may be obtained from the Chief of the Hydrology Bureau.

III. LOCAL AREA ASSESSMENT PROCEDURES

Section III.A, Local assessments: The limits provided in Section III.A.1a, b, and c of the guidelines provide the acceptable drawdowns on existing wells near a proposed well. Drawdown limits are established to maintain a water supply for a minimum time period of at least 40 years. While regional guidelines evaluate impacts to 2045, this time frame may not afford adequate water level restriction to wells that are completed later in the planning period. For this reason, local assessments evaluate 40-year declines from the year in which the application is evaluated. Other differences between regional and local assessments are provided in Appendix B**.**

Section III.A.1.a, 70 percent limit: Under the guidelines, applications to appropriate water from the High Plains aquifer in the LCUWB, in conjunction with the full exercise of existing rights, may be permitted to reduce water levels at existing well sites up to 70 percent of the current aquifer thickness (Figure 7).

In general, wells that pump water to a greater elevation will be more costly to operate compared to those wells with shorter pumping lifts. Although declining water levels will increase pumping costs, these costs may not necessarily represent a significant hardship upon the well owner. The 70 percent guideline is applied to identify the pumping level at which the well may become uneconomical to operate. In some cases, it may also coincide with the point in which declines in well yield become apparent.

Impacts due to the full use of existing water rights, the self-induced impacts by the affected well, and the impacts from the proposed well are summed to obtain the total drawdown. This water level lowering is compared to 70 percent of the current saturated thickness to apply the guideline.

The 70 percent guideline is based on information provided in Groundwater and Wells, Driscoll, Fletcher G, 1986, page 217; and Heath, Basic Ground-Water Hydrology, 1983, page 45.

In addition to economic considerations, local assessments also include an evaluation of the allowable drawdown based on the pumping water level necessary for well operation. The pumping water levels during operation should remain above the top of the pump intake and will vary depending on whether the well is used for domestic or non-domestic purposes, in addition to other factors. These limits are provided in the sections below.

The 70 percent and allowable drawdown for well production are both evaluated and the most restrictive limit is typically applied for decision-making (Figure 8).

Section III.A.1.b, Drawdown limit on domestic wells: This section provides that applications to appropriate water from the High Plains aquifer, in conjunction with the full exercise of existing rights, may be permitted to reduce the aquifer thickness at existing domestic well sites to 20.0 feet.

For systems like the High Plains aquifer, a 20-foot saturated interval is generally considered adequate for domestic well operation to maintain pump submergence and to avoid sediment problems. A value other than 20 feet may be appropriate in some cases.

Section III.A.1.c, Drawdown limit on non-domestic wells: This section provides that applications to appropriate water from the High Plains aquifer, in conjunction with the full exercise of existing rights, may be permitted to reduce the aquifer thickness at existing non-domestic well sites to 55.0 feet.

The 55.0-foot non-pumping limit was obtained by adding the dynamic drawdown of 30 feet to the saturated thickness of 25 feet for pump operation. If information is available suggesting these values are inappropriate, the 55.0-foot non-pumping limit for local assessments may be revised.

Section III.A.2, Drawdown allowance: Under the guidelines if any limit provided in III.A.1 is reached due to the use of existing rights, the application may be permitted to induce a drawdown allowance up to 1.0 foot in 40 years. The guideline is provided so negligible impacts are not the basis for application denial. The OSE may re-define the negligible level of impact for a particular case at any time if the cumulative effects become excessive.

> Example
> An existing well site is predicted to lose more than 70 percent of the saturated thickness due to the use of existing rights. A proposed well may be permitted if its effects on the subject well do not exceed 1 foot in 40 years, unless other allowances are deemed more appropriate, or other statutory requirements have not been met.
>
> Example
> A proposed well will cause the saturated thickness to drop from 56 to 53 feet within 40 years at an existing irrigation well site (the effects of existing water rights and self-induced impacts have been taken into account). The OSE could deny the application because the saturated thickness has declined below 54 feet.

Section III.A.3, Replacement wells: Applications to construct a replacement well within 100 feet of the existing well location may be permitted without performing a hydrologic evaluation of the new location. The State Engineer assumption is that pumping from a new well within 100-feet of the old well will cause no impairment to existing water rights.

The guideline is provided to address concerns by the LCWUA that the permitting of replacement well, which may be required for emergency purposes, should not be delayed due to the protest of junior users. The guideline is applicable to cases where there is no impairment.

Section III.A.4, Other formations: For wells completed in formations other than the High Plains aquifer in the LCUWB, assessments may be performed in relation to the water column rather than aquifer thickness. This approach is necessary since the base of the aquifer may be unknown or it may be impractical to complete wells to the aquifer base. Applications may be permitted to reduce the current available water column in existing wells up to 70 percent, or to the minimum required water column derived from using the procedures presented in Morrison (2006), or to other limits selected by the OSE.

Section III.A.5, Other considerations: Under the guidelines, decisions pertaining to local impairment shall be made on a case-by-case basis. Failure to meet one or more restriction may be sufficient for rendering a negative decision. The Director of Water Rights may also consider:

- Validity and priority date of the water right of the affected well.
- Age of the wells affected.
- Conditional approval for an amount lower than requested to meet drawdown restrictions.
- Conditional approval based on the submittal of an acceptable monitoring and mitigation plan.
- Other considerations the OSE may deem appropriate.

This guideline provides flexibility to the Director of Water Rights in applying the suggested restrictions for local assessments. The decisions are to be made by the Director to maintain consistency within the state. Following the restrictions precisely in Section III.A may result in unreasonable decisions for some applications.

Section III.B, Calculations: Section III.B provides several instructions for performing local assessments. Wells included in the analysis are selected on a case-by-case basis and should be within the radius of significant drawdown caused by the proposed well. Protestant wells should also be included in the analysis. Additional information is provided in Section I.K of this report.

APPLICATION OF GUIDELINES

The guideline restrictions should be applied unless other limitations are deemed more appropriate by the Director of Water Rights and Chief of the Hydrology Bureau. Flexibility in applying the restrictions is appropriate since site conditions may vary from those used to formulate the guidelines. The restrictions selected may be less conservative, or more conservative, relative to the guidelines adopted on September 16, 2009.

It may be un-necessary to apply every section of the guidelines to process an application. On the other hand, considerations may be required that are not described explicitly in the guidelines (such as water quality).

A flow chart showing the general evaluation process is provided in Figure 9. Additional information on the review process follows:

- The block administrative guidelines (Section II) are un-necessary to consider if the move-from and move-to well are within the same model cell, but a local area assessment may still be necessary.
- The guidelines for block and local assessments (Sections II and III, respectively) become un-necessary for consideration for a proposed change in use with no change in point of diversion or diversion amount.
- With respect to the 70% and other minimum saturated thickness guidelines, generally the more restrictive should be used for decision-making. Other factors such as data reliability and uncertainty may also affect decisions.
- When negative decisions are contemplated, that are based solely on the failure to meet the local assessment guidelines, applications should be re-examined in coordination with upper management by considering the factors listed in Section III.A.5 of the guidelines.

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APPENDIX A: WATER RIGHT DOCUMENTS PROCESSED

Table A-1 Water rights documents processed by fiscal year. Compiled from OSE annual reports for LCUWB.

Water rights document	Lea County Basin				
	FY04	FY05	FY06	FY07	FY08
Declaration of water right			1	2	27
Appropriation: irr. mun., ind., com.		2		4	
Appropriation: domestic/stock	140	178	35	236	193
Appropriation: oil well drilling	31	34		42	21
Supplemental well	20	12	8	24	34
Repair/deepen well	26	10		20	43
Change loc. of well		11	2	12	14
Change place or purpose of use	5	2	4	10	11
Change well loc., place/purpose	8	10		13	19
Combine wells, uses			1		
Extensions of time	90	50	26	90	52
Change of ownership	86	72	60	267	140
Well and/or plugging record	151	99	50	323	361
Proof of beneficial use	2		2	5	8
Test or exploratory well	29	7	18	18	43

APPENDIX B: COMPARISON OF ADMINISTRATIVE POLICIES ADOPTED IN 1952 AND 2009 FOR THE LCUWB

The CMA approach is essentially the block administration system that has been used in the region in the past. The basin was previously administered using blocks of 36-square miles. Administration using the block system is based on the selection of a portion of the aquifer that could be de-watered during a 40-year planning period. Once a block reached its maximum allowable limit of de-watering, new appropriations or transfers into the block were not allowed. The guidelines maintain this general method and employ a significantly smaller block size of one square mile.

The policies adopted in the past also share the following similarities with the new guidelines:

- Administration is based on a 40-year planning period with a specified end date;
- The basin is subdivided into uniform blocks of a specified size;
- Groundwater models are used to predict 40-year impacts in each block due to the full exercise of existing water rights; and
- Blocks with less water have more stringent limitations compared to other blocks;
- Impacts from wells located in Texas are considered.

Past procedures focused on identifying areas where new appropriations could or could not be allowed while the new guidelines focus on the processing of water right transfers and supplemental wells.

The new guidelines also provide direction on the methods to apply for local impairment assessments. Local assessments may have been performed in the past on some applications but these procedures do not appear to have been discussed in the early policy documents. The 2009 guidelines apply block and local assessments in tandem to provide information for application processing, but at different spatial and temporal scales. A comparison of block and local assessments is provided in Table B-1.

Table B-1 Comparison of block and local assessments for the LCUWB

Topic	Block Assessment	Local Assessment
Effect of CMA designation	The CMA designation influences the types of applications that may be considered. Transfers from the non-CMA to CMA are generally not allowed. Drawdown restrictions are more stringent for CMAs.	A CMA /non-CMA designation has no bearing on local assessments. Impacts are computed for nearby wells of other ownership regardless of the CMA designation.
Available Model	The OSE model (Musharrafieh and Chudnoff, 1999) is used to estimate drawdown due to existing rights and the proposed well. Other models may be applied as deemed necessary.	The Theis equation is typically used to evaluate declines due to a proposed well but a numerical model may also be used. Impacts due to the use of existing rights may be obtained using a numerical model.
Estimates required to apply the guidelines	Calculations are performed to obtain the drawdown on non-CMAs and CMAs. The remaining saturated thickness is also computed for non-CMAs. Diversions are assumed to begin in the year the calculations are being performed and end in year 2045.	Calculations are performed to obtain drawdown and the remaining saturated thickness at nearby well sites 40-years into the future from the year the calculations are performed. Drawdowns may be compared to the water column for wells producing from the Triassic and older strata.
Drawdown limits	Two limits for non-CMAs apply and the most restrictive may be used for decision-making. Drawdowns from a well proposal are limited to 0.20 feet per year times the number of years in the simulation period. Drawdowns from existing and proposed wells may drop the saturated thickness to 55.0 feet by 2045.	Drawdowns may be limited to 70 % of the current saturated thickness at each nearby well producing from the High Plains aquifer. For domestic wells, declines should not reduce the saturated thickness to less than 20.0 feet and the drawdown allowance. For nearby non-domestic wells, drawdowns shall not reduce the saturated thickness to less than 55.0 feet and the drawdown allowance. For wells producing from aquifers other than the High Plains aquifer, drawdowns are limited to 70 % of the current water column in each well. Other drawdown limitations are selected on a case-by-case basis. The OSE has discretion in applying the limits for rendering application processing decisions.
Drawdown Allowance	For CMA cells, drawdowns from a well proposal are limited to 0.025 ft/yr times the number of years in the simulation period.	If the drawdown limits are exceeded, either by existing wells or the proposed use, 1 foot over 40 years may be allowed.

APPENDIX C: WATER QUALITY[14]

Water quality in the High Plains aquifer is generally good in the LCUWB, and the water, although hard, is generally suitable for domestic, municipal and irrigation use (Hart and McAda, 1985). Specific conductance (SC) of groundwater in the aquifer is generally less than 1,000 micromhos per centimeter (µmhos/cm), although SC as high as 21,500 µmhos/cm has been measured in Ogallala Formation groundwater (LHI, 2000; table 6-7). These SC values translate into a range of TDS of less than 300 milligrams per liter (mg/L) to almost 14,000 mg/L. Specific conductance in most of the Lea County Basin remained stable from the mid-1980s to 1998, and SC even decreased in some areas (LHI, 2000; figs. 32).

Increases in SC over this period have occurred in only one area, located along the New Mexico-Texas state line in the northeastern corner of the Lea County Basin in Townships 12 and 13 South, Range 38 East, where SC has increased to over 1,000-1,500 µmhos/cm (LHI, 2000; figs. 32 and 33). This area corresponds with an area with water-level decline rates of over 1.0 ft/yr from 1971-2000. Cause of the increase in SC in this area is unknown, but may be from continued migration of oil-field brines from unlined disposal pits, or from upward migration of high TDS water (LHI, 2000; p. 6-18).

Incidences of TDS and chloride contamination of groundwater in the High Plains aquifer have been documented at numerous sites in the Lea County Basin. Most are associated with oil and gas activities; of the 197 cases of contamination in Lea County since 1986, 141 cases were associated with oil-field activity or petroleum processing, and 64 percent of those were caused by produced oil-field brine wastewater (LHI, 2000; p. 6-25). Other point sources of groundwater contamination in Lea County include leaking underground storage tanks, landfills, septic systems, feedlots, and dairies. Nitrates from these sources have affected some wells. The City of Hobbs has experienced ongoing nitrate contamination problems at its municipal supply wells (LHI, 2000; p. 6-28), and the Lovington Country Club was recently (April 2003) under public notification order by the New Mexico Environment Department for nitrate concentrations in water from its well that exceeds drinking water standards.

Incidences of non-point source groundwater contamination have also been documented in the Lea County Basin. Contaminants include pesticides, fertilizers, and TDS, reportedly originating from irrigation return flow.

[14] Prepared by Mike Johnson, OSE Hydrology Bureau, and Linda Logan, formerly of the OSE Hydrology Bureau.

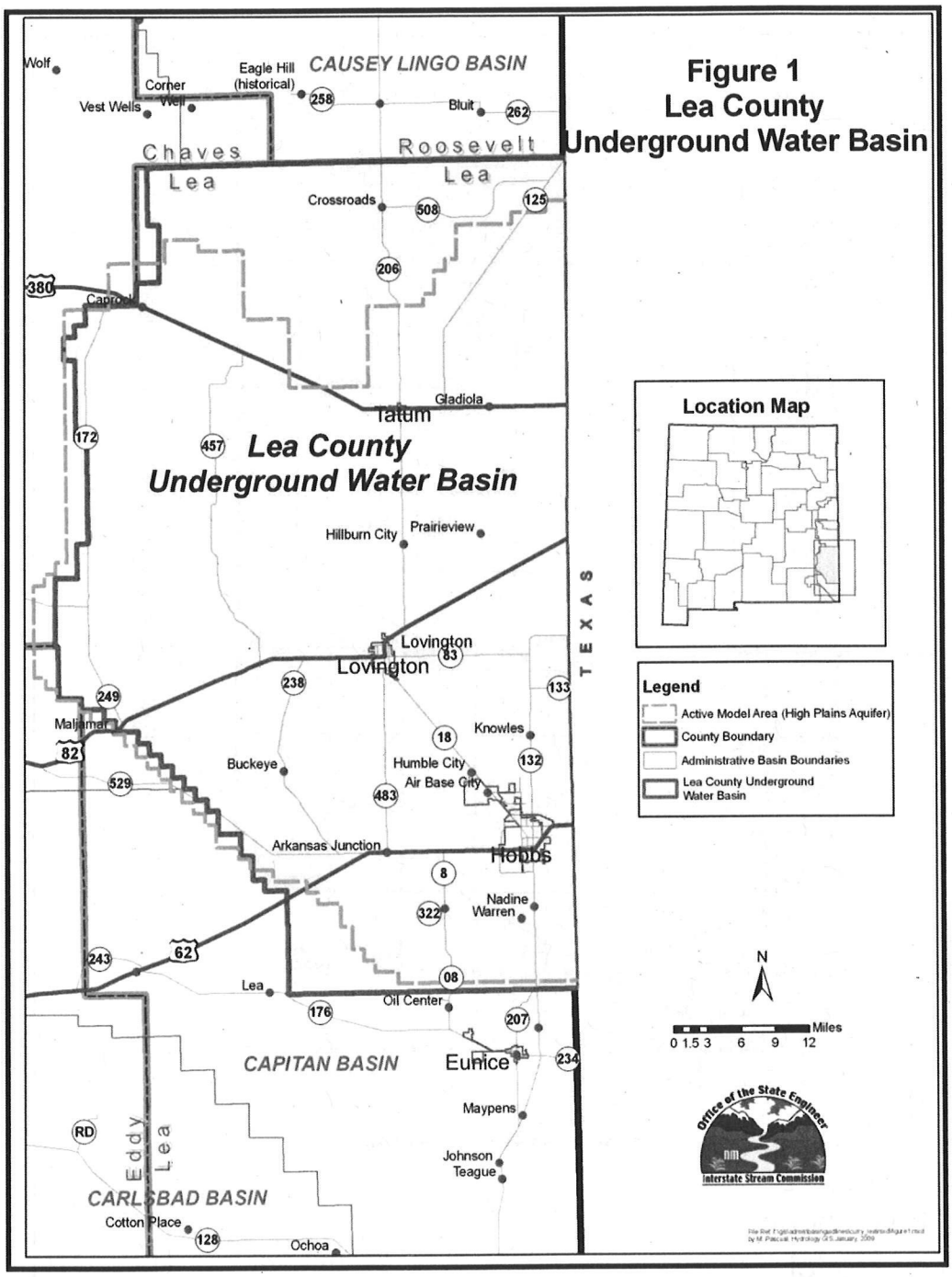
Figure 1
Lea County
Underground Water Basin
Lea County
Underground Water Basin
CAUSEY LINGO BASIN
CAPITAN BASIN
CARLSBAD BASIN
Chaves
Lea
Roosevelt
Lea
Eddy
Lea
TEXAS
Wolf
Eagle Hill
(historical)
Corner
Well
Vest Wells
Bluit
Crossroads
Caprock
Tatum
Gladiola
Hillburn City
Prairieview
Lovington
Lovington
Maljamar
Buckeye
Knowles
Humble City
Air Base City
Arkansas Junction
Hobbs
Nadine
Warren
Lea
Oil Center
Eunice
Maypens
Johnson
Teague
Cotton Place
Ochoa
Location Map
Legend
Active Model Area (High Plains Aquifer)
County Boundary
Administrative Basin Boundaries
Lea County Underground Water Basin
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Miles
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Office of the State Engineer
Interstate Stream Commission

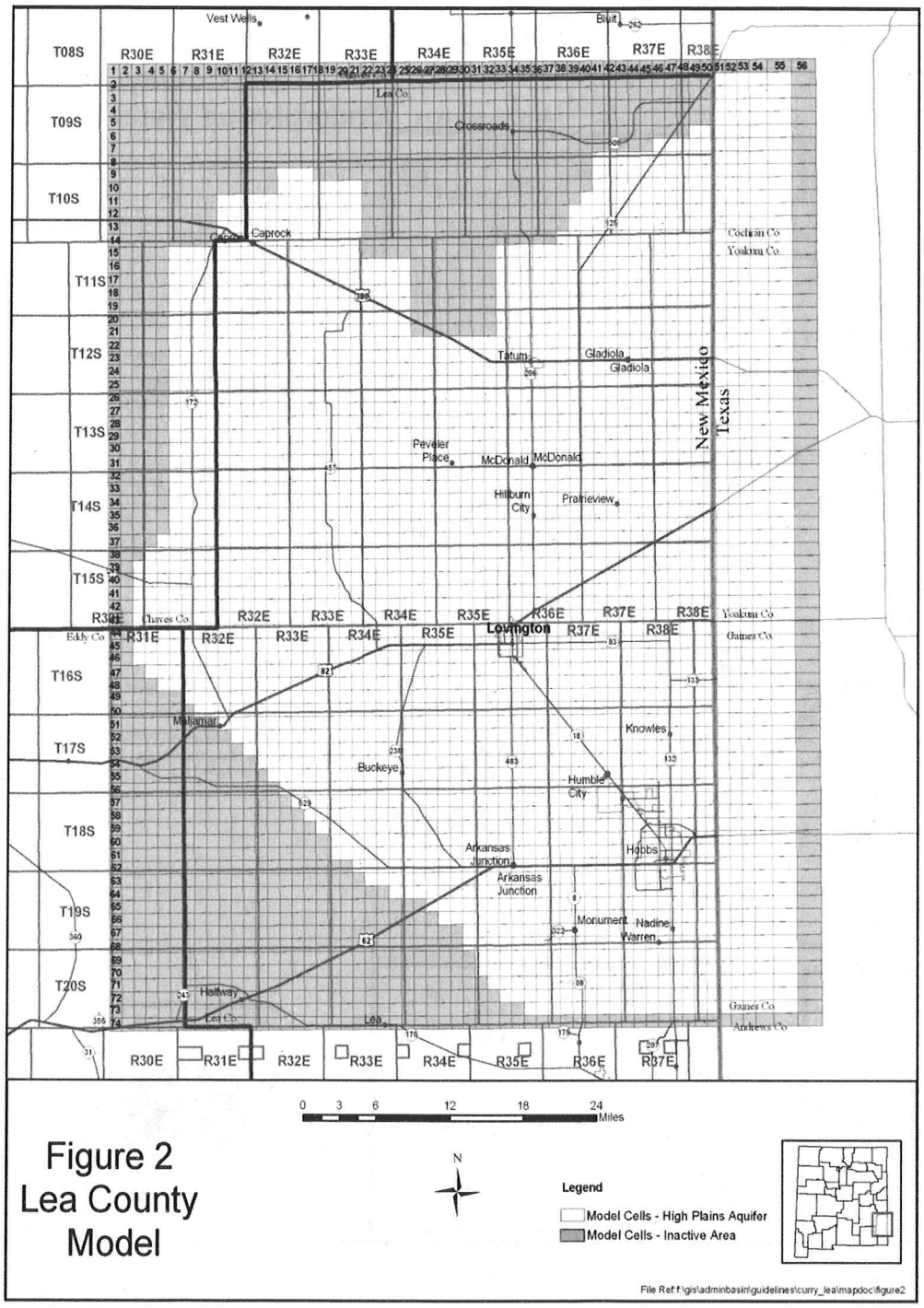


Figure 2
Lea County
Model

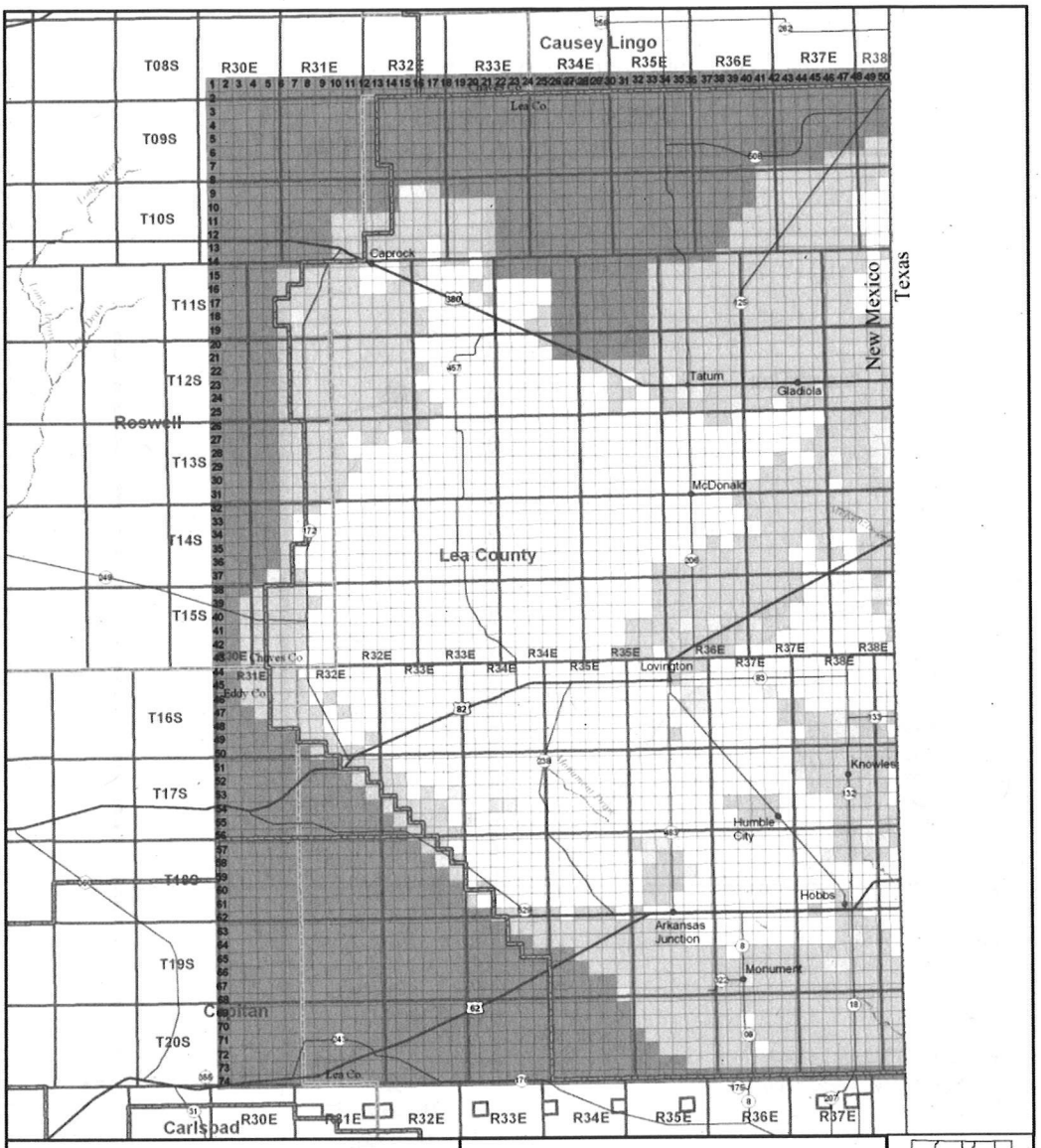


Figure 3
Critical Management Areas
Lea County Basin

Legend

Inactive Model Area

Critical Management Areas

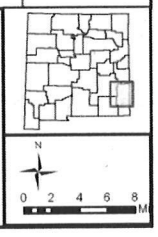
Saturated Thickness = 0

Saturated Thickness > 0 and </=55 Year 2045

Saturated Thickness >55 Year 2045

Declared Groundwater Basins

File Ref:f:\gis\admin\guidelines\curry_lea\mapdoc\final_figure3_modCA



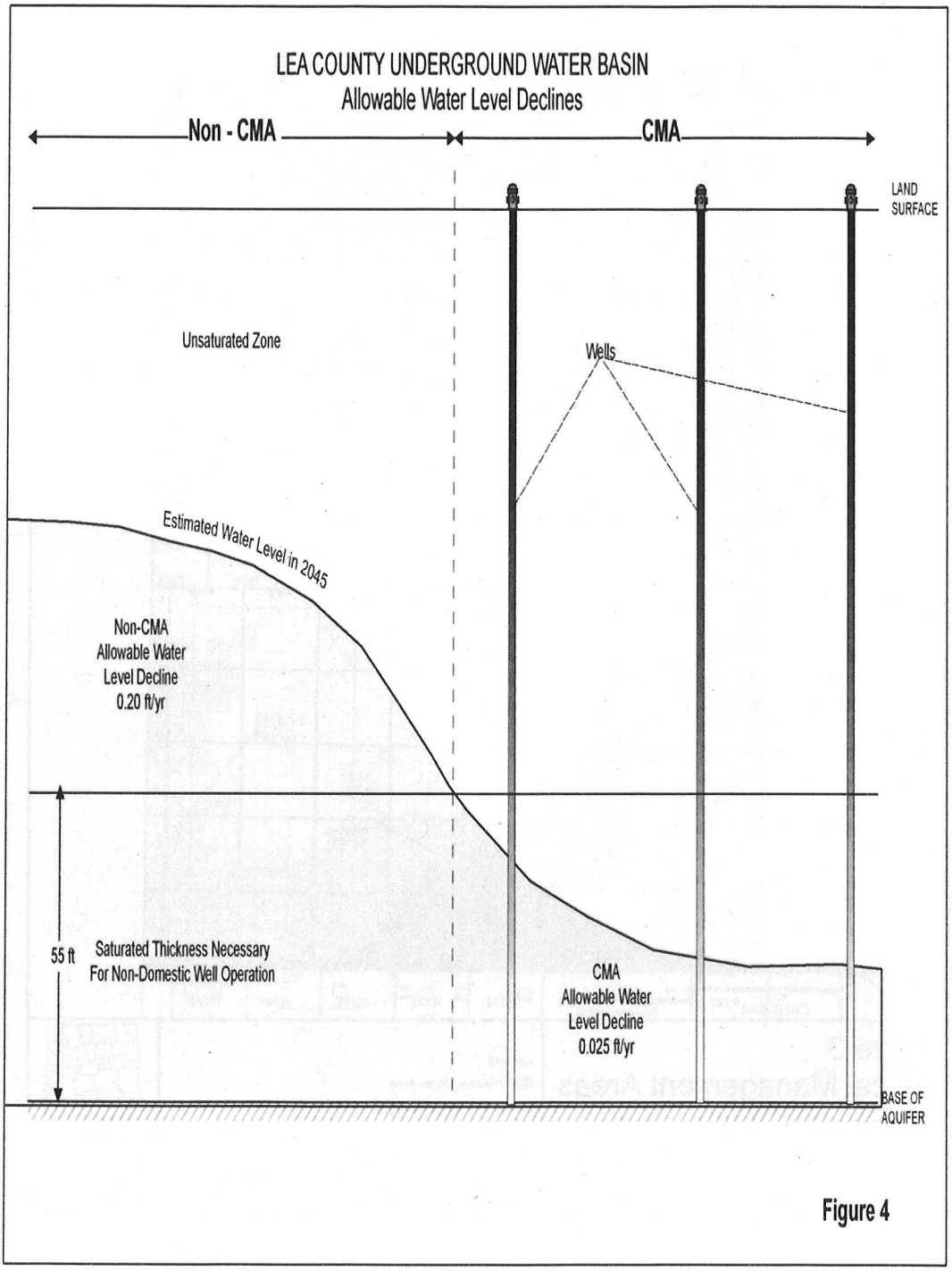
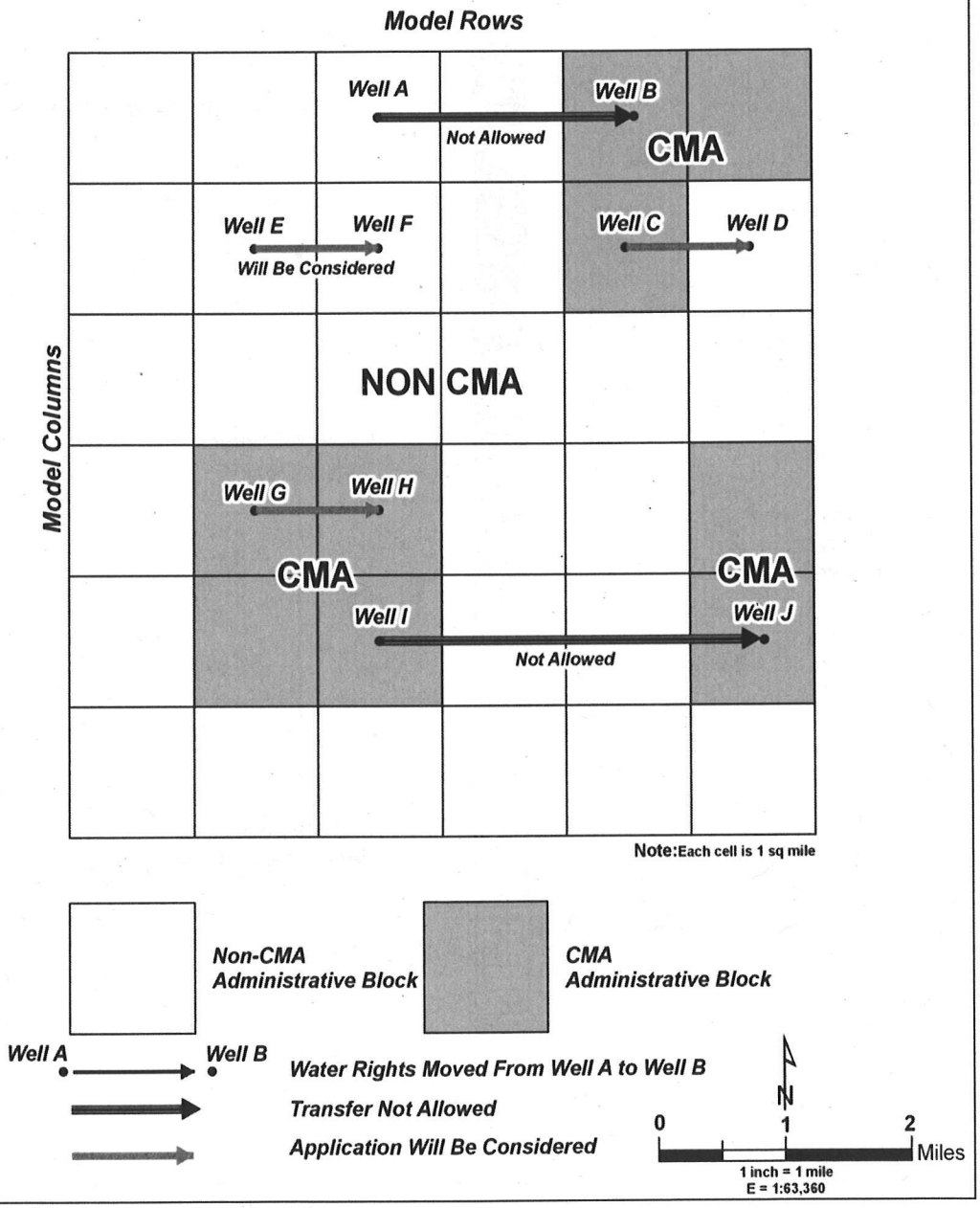

LEA COUNTY UNDERGROUND WATER BASIN
Allowable Water Level Declines
Non - CMA
CMA
LAND SURFACE
Unsaturated Zone
Wells
Estimated Water Level in 2045
Non-CMA
Allowable Water
Level Decline
0.20 ft/yr
55 ft
Saturated Thickness Necessary
For Non-Domestic Well Operation
CMA
Allowable Water
Level Decline
0.025 ft/yr
BASE OF AQUIFER

Figure 4

Figure 5
NON-CMA AND CMA ADMINISTRATIVE BLOCKS
WATER RIGHT TRANSFER OPTIONS



BASIS FOR 55 FOOT CMA LIMIT
Lea County Basin

Diagram of lower portion of well

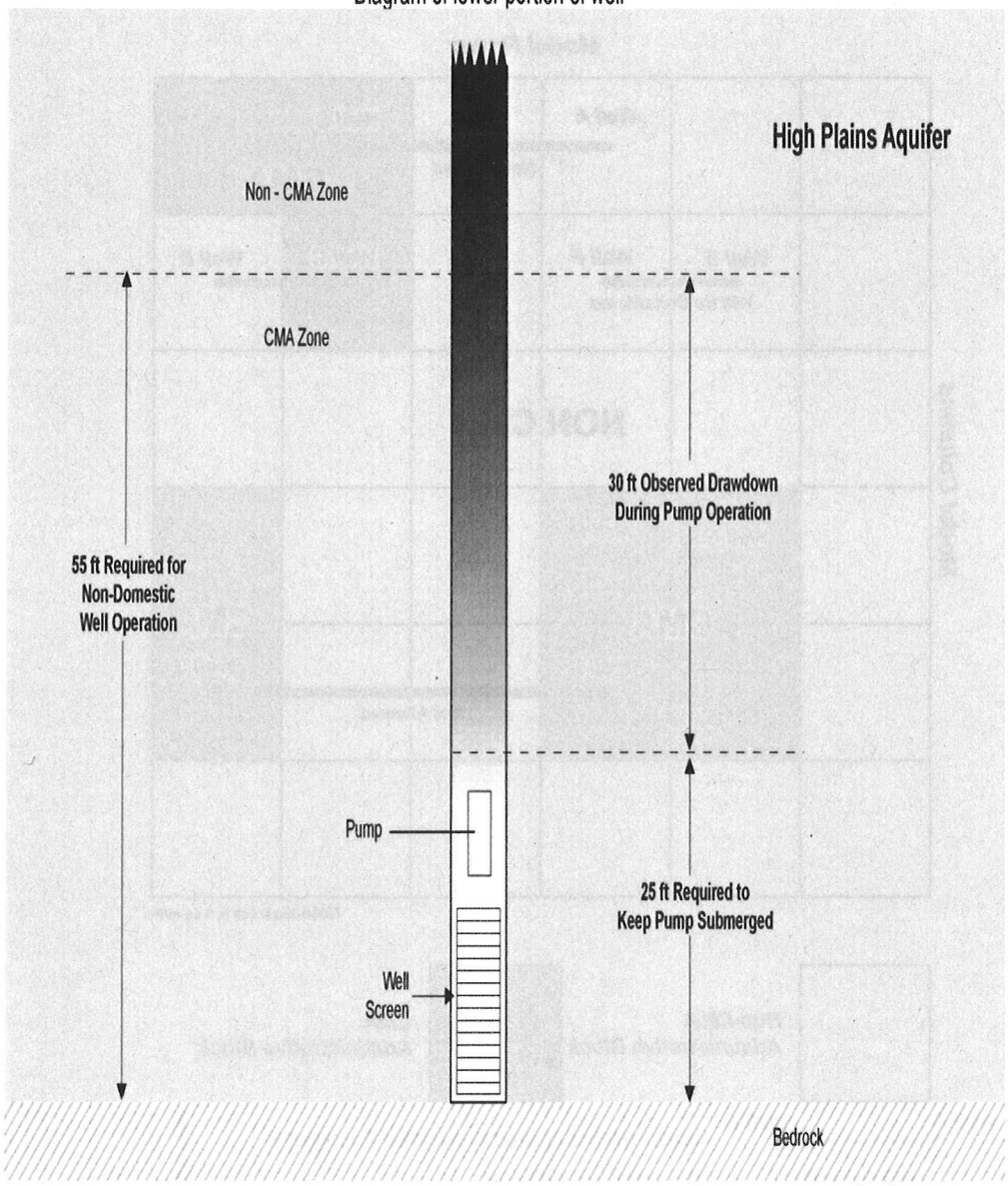


Figure 6

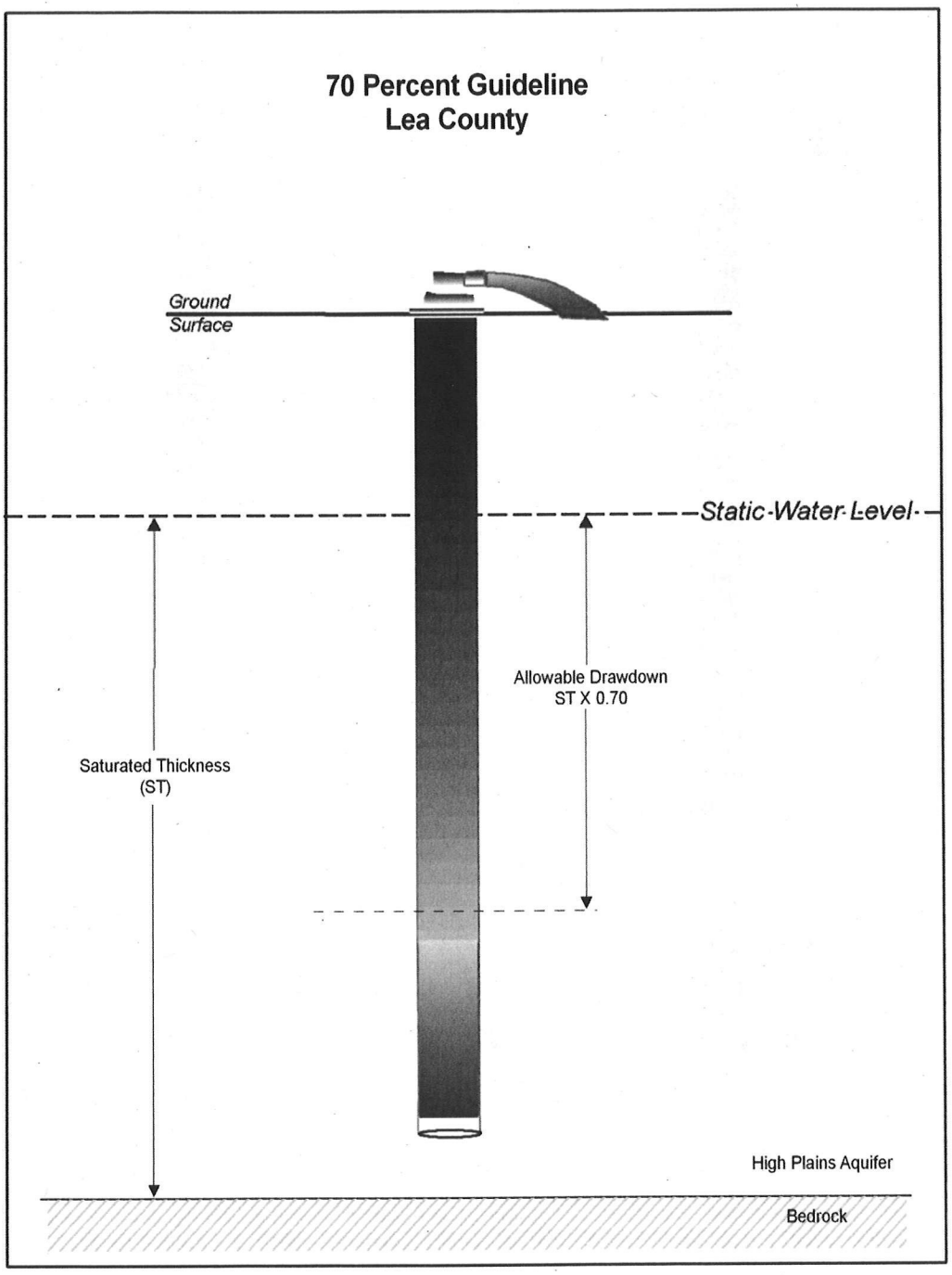
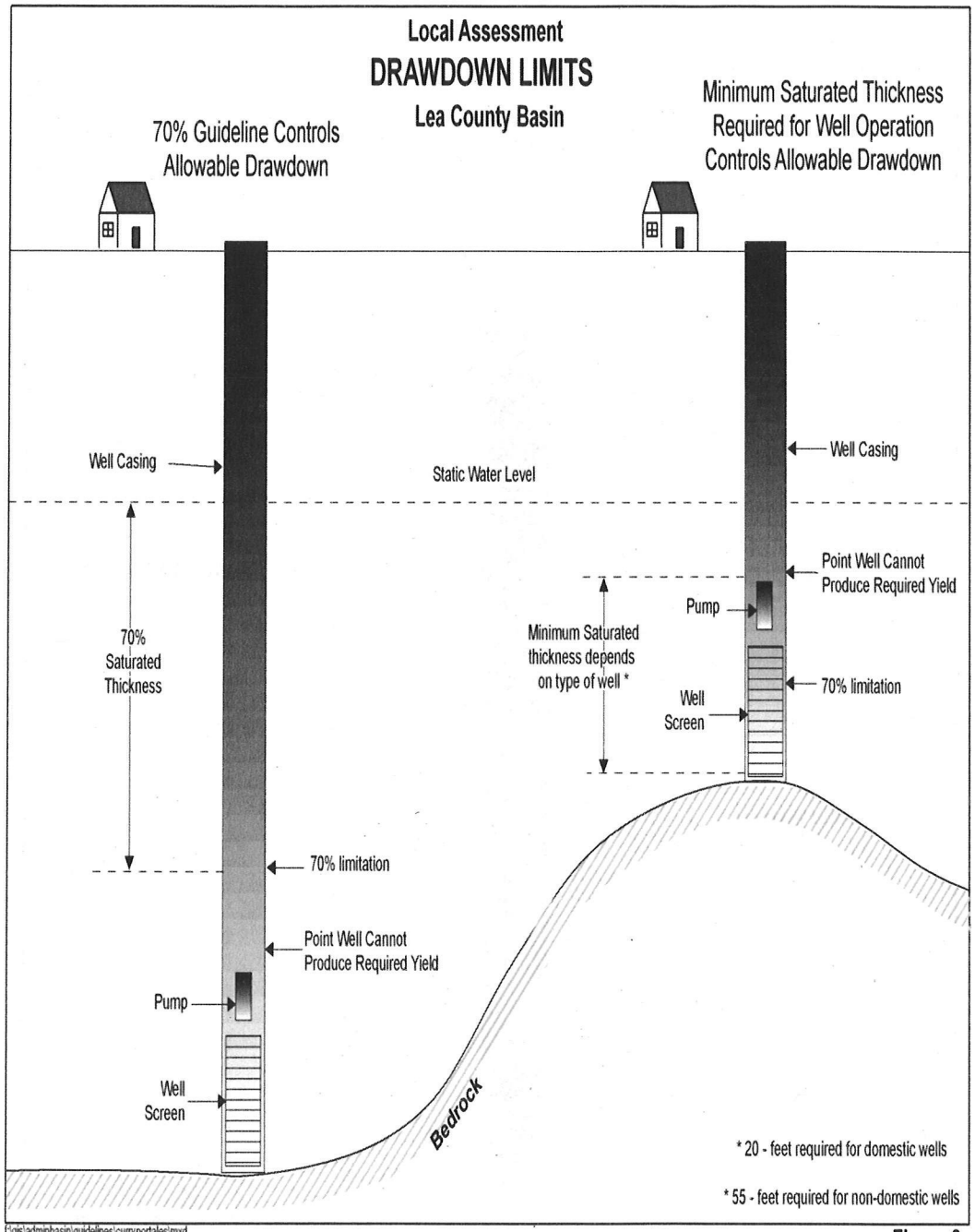

70 Percent Guideline
Lea County
Ground
Surface
Static Water Level
Allowable Drawdown
ST X 0.70
Saturated Thickness
(ST)
High Plains Aquifer
Bedrock

Figure 7



f:\gis\adminbasin\guidelines\curryportales\mxd
\drawdownlimits.mxd

Figure 8

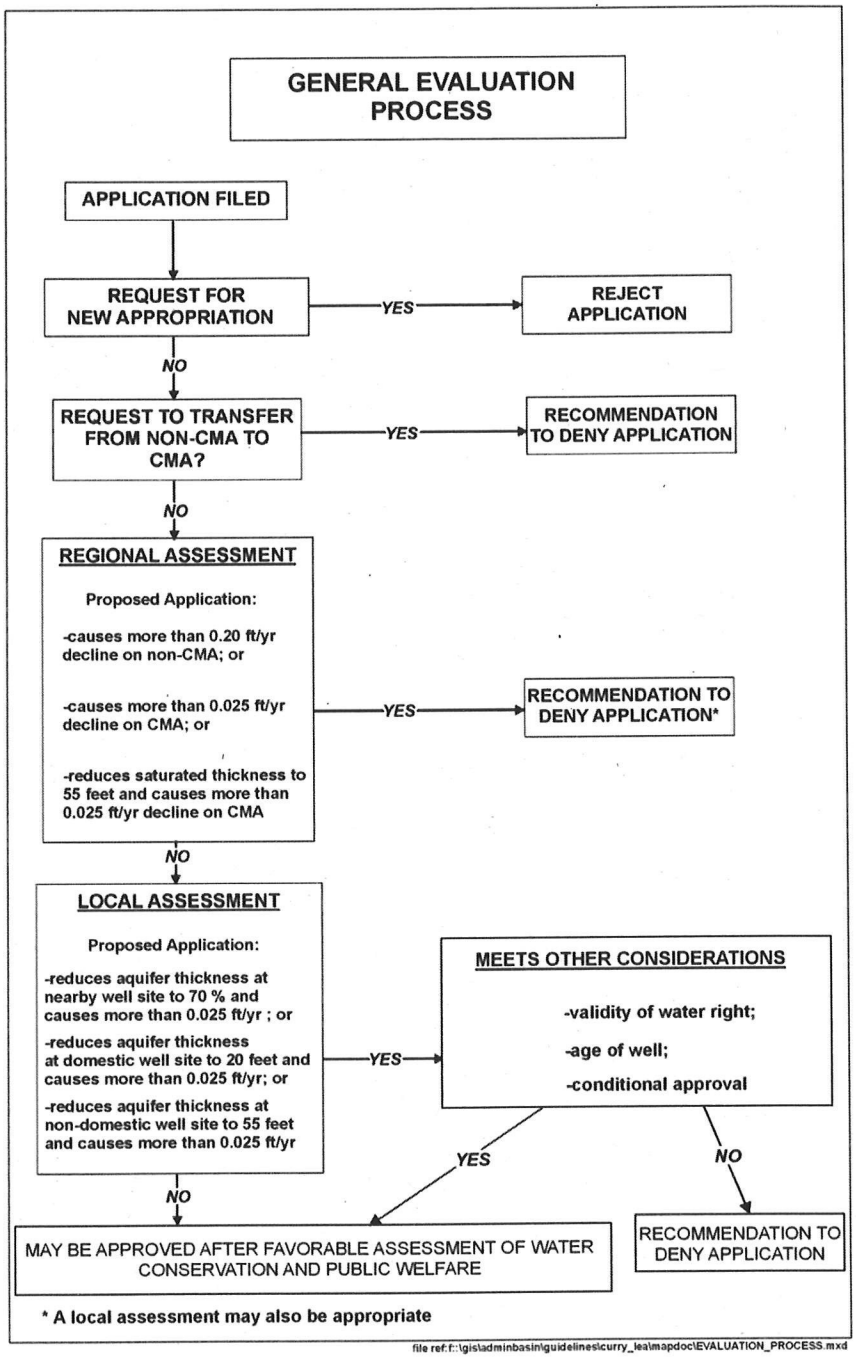

GENERAL EVALUATION PROCESS
APPLICATION FILED
REQUEST FOR NEW APPROPRIATION
YES
REJECT APPLICATION
NO
REQUEST TO TRANSFER FROM NON-CMA TO CMA?
YES
RECOMMENDATION TO DENY APPLICATION
NO
REGIONAL ASSESSMENT
Proposed Application:
-causes more than 0.20 ft/yr decline on non-CMA; or
-causes more than 0.025 ft/yr decline on CMA; or
-reduces saturated thickness to 55 feet and causes more than 0.025 ft/yr decline on CMA
YES
RECOMMENDATION TO DENY APPLICATION*
NO
LOCAL ASSESSMENT
Proposed Application:
-reduces aquifer thickness at nearby well site to 70 % and causes more than 0.025 ft/yr ; or
-reduces aquifer thickness at domestic well site to 20 feet and causes more than 0.025 ft/yr; or
-reduces aquifer thickness at non-domestic well site to 55 feet and causes more than 0.025 ft/yr
YES
MEETS OTHER CONSIDERATIONS
-validity of water right;
-age of well;
-conditional approval
YES
NO
NO
MAY BE APPROVED AFTER FAVORABLE ASSESSMENT OF WATER CONSERVATION AND PUBLIC WELFARE
RECOMMENDATION TO DENY APPLICATION
* A local assessment may also be appropriate
file ref:f:\gis\adminbasin\guidelines\curry_lea\mapdoc\EVALUATION_PROCESS.mxd

Figure 9