Aquifer Storage and Recovery Project

2010 Annual Accounting Report

prepared for

City of Wichita

Wichita, Kansas

July 2011

Project No. 59859

INDEX AND CERTIFICATION

Aquifer Storage and Recovery Project
2010 Accounting Report
City of Wichita

Project 59859

Report Index

Chapter Number	Chapter Title	Number of Pages
1	Introduction	2
2	2010 Operations	3
3	Hydrologic Conditions	5
4	Groundwater Modeling	11
Appendix A	2010 Index Cell Water Budget Summaries	77
Appendix B	2010 Water Budget Report with ASR	21
Appendix C	Chemical, Physical, Radiological and Biological Quality of Water Diverted & Stored	61
Appendix D	2010 Historic Index Water Level Data	26
Appendix E	Key Groundwater Quality Parameters	38
Appendix F	2010 Monthly & Annual Precipitation Data	25
Appendix G	2010 Withdrawals from Non-Domestic Wells	27
Appendix H	2010 Annual Streamflow, Including Baseflow & Above Baseflow Stage	10

Certification

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Paul A. McCormick, P.E.
Date: JULY 07, 2011
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TABLE OF CONTENTS

Page No.

1.0 INTRODUCTION...1-1
1.1 Background...1-1
1.2 Accounting Report Components...1-1

2.0 2010 OPERATIONS...2-1
2.1 Type Of Source Water Used For Recharge...2-1
2.2 Quantity of Water Available...2-1
2.3 Quantity of Water Diverted...2-1
2.4 Recharge Techniques Utilized...2-1
2.5 Quantity Recharged by Each Technique...2-1
2.6 Total Quantity of Source Water Stored in Basin Storage Area...2-2
2.7 Chemical, Physical, Radiological and Biological Quality of Each Type of Water...2-3
2.8 Monthly and Annual Summary of Recharge Credits Withdrawn....2-3

3.0 HYDROLOGIC CONDITIONS...3-1
3.1 Quarterly Index Water Levels...3-1
3.2 Key Groundwater Quality Parameters...3-1
3.3 Monthly and Annual Precipitation Data...3-1
3.4 Withdrawals from Non-domestic Wells...3-1
3.5 Annual Streamflow, Including Baseflow and Above Baseflow Stage...3-4
3.6 Summary of Conjunctive Use Amounts...3-4
3.7 Water Supply and Demand Forecast for the Next Three Years...3-5

4.0 GROUNDWATER MODELING...4-1
4.1 Background...4-1
4.2 Model Implementation for ASR Accounting...4-3
4.3 Model Setup and Implementation...4-3
4.4 Basin Storage Area Stresses for Model Input...4-4
4.4.1 Precipitation and Recharge...4-4
4.4.2 Streamflow...4-4
4.4.3 Groundwater Pumping...4-5
4.5 Model Calibration...4-5
4.6 Model Water Budget...4-5
4.7 Specific Water Budget Components...4-7
4.7.1 Natural and Artificial Recharge...4-7
4.7.2 Groundwater Inflow and Outflow...4-8
4.7.3 Evaporation and Transpiration...4-8
4.7.4 Groundwater Diversions from Non-Domestic Wells...4-8
4.7.5 Infiltration from Streams...4-8
4.7.6 Groundwater Discharge to Streams...4-9
4.8 Calculated Recharge Credits...4-9

Appendices

Appendix A .... 2010 Index Cell Water Budget Summaries

Appendix B .... 2010 Water Budget Reports

Appendix C .... Chemical, Physical, Radiological and Biological Quality For Water Diverted & Stored

Appendix D .... Historic Index Well Water Level Data

Appendix E .... Key Groundwater Quality Parameters

Appendix F .... 2010 Monthly & Annual Precipitation Data

Appendix G .... 2010 Withdrawals from Non-Domestic Wells

Appendix H .... 2010 Annual Streamflow, Including Baseflow & Above Baseflow Stage

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LIST OF TABLES

Table No. **Page No.**

2.1 2010 Metered Diversion, Recharge and Recovery Volumes....................2-2
2.2 Total Quantity Recharged to Basin....................2-3

3.1 City of Wichita Three-Year Projected Water Demand....................3-5

4.1 Model Simulated Stream Flows....................4-4
4.2 Modeled Average Annual Precipitation....................4-7
4.3 2010 Recharge Credit Summary....................4-10

LIST OF FIGURES

Figure No. **Page No.**

1.1 ASR Facility Locations....................1-2

3.1 January 2010 Water Level Contour Map....................3-2
3.2 January 2011 Water Level Contour Map....................3-3
3.3 Little Arkansas River Flow & Diversion Well Operations, Jan 1 – Dec 31, 2010....................3-4

4.1 Accounting Model Area and Boundary Conditions....................4-2
4.2 Index Accounting Cells as Hydrostratigraphic Units....................4-6

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1.0 INTRODUCTION

The purpose of this report is to provide a summary of the recharge and recovery activities for the City of Wichita Aquifer Storage and Recovery (ASR) project in the *Equus* Beds aquifer during calendar year 2010 and to provide an accounting of recharge credits claimed for the year as required by the Kansas Department of Agriculture, Division of Water Resources (DWR).

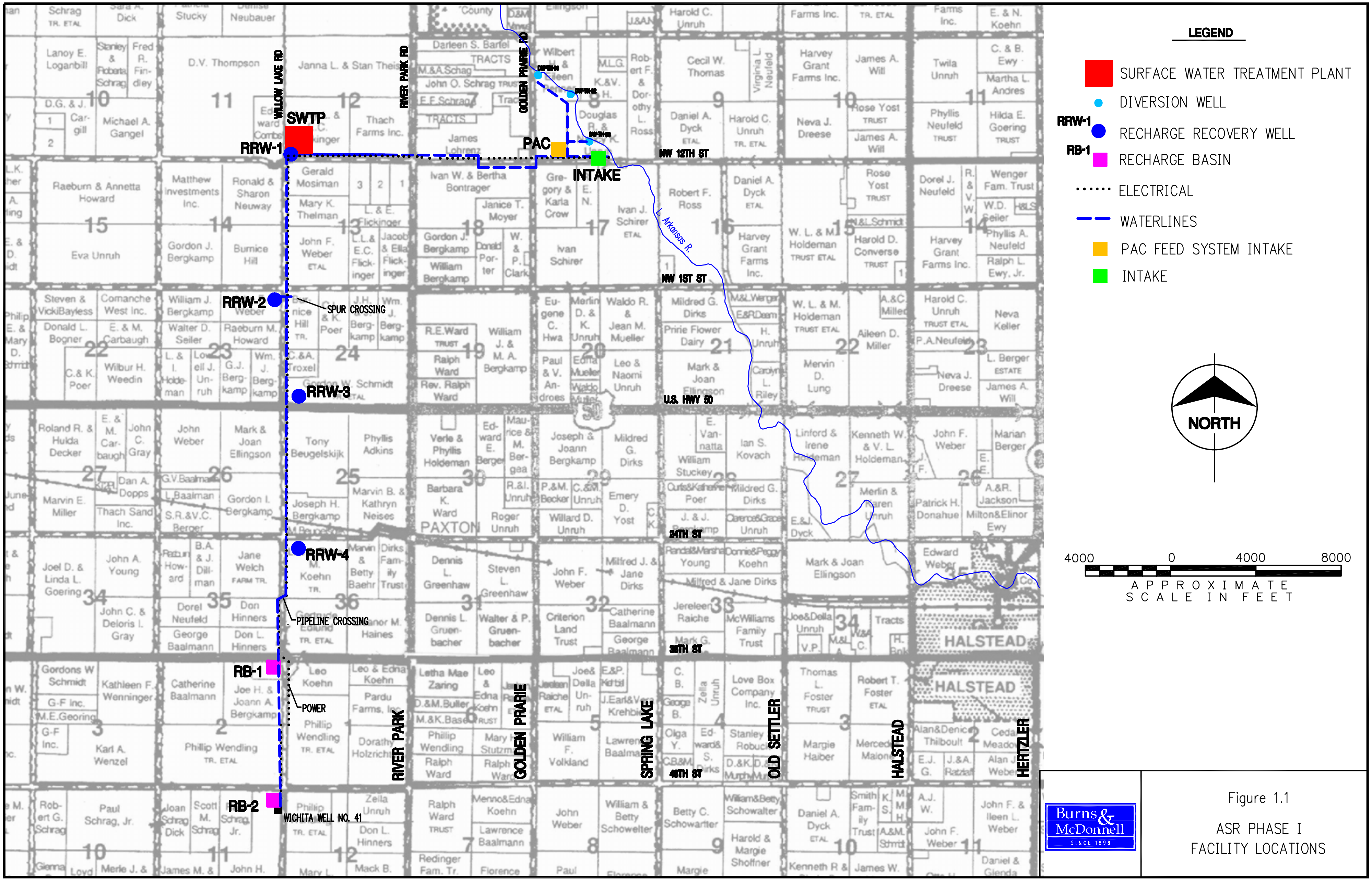
1.1 Background

Construction of Phase I of the City's ASR project was substantially complete on September 13, 2006. Phase II is currently under construction. Phase I, designed to permit recharge of up to 10 million gallons per day (MGD), consists of three diversion wells, a surface water intake, a surface water treatment plant, 15 miles of pipeline, four recharge wells, two recharge basins and 50 monitoring wells. The Phase I recharge facilities are strategically located with the intent of developing a hydraulic barrier to slow the advancement of the Burrton brine plume toward the Wichita well field. A map of the facilities is presented in Figure 1.1. During 2010 the City operated the Phase I project utilizing the three diversion wells, the four recharge wells, and Recharge Basin No. 2.

1.2 Accounting Report Components

The Basin Storage Area is defined by the DWR in the Chief Engineer's Order approving the Wichita ASR applications, and is delineated by the index cells. Per the DWR Chief Engineer's Order, "recharge credit accounting shall use a groundwater flow model and specifically address the following items for each cell in the Basin Storage Area" :

- Natural and artificial recharge
- Groundwater inflow and outflow
- Evaporation and transpiration
- Groundwater diversions from all non-domestic wells
- Infiltration from streams
- Groundwater discharge to streams
- Calculated recharge credits
- Surface water diversions



Burns & McDonnell SINCE 1898

Figure 1.1

ASR PHASE I
FACILITY LOCATIONS

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2.0 2010 OPERATIONS

The ASR Phase I project operated for the fourth full year in 2010. Diversion of above baseflow water is permitted when flow in the Little Arkansas River as measured at the Highway 50 gage exceeds 20 cubic feet per second (cfs) between October 1 and March 31, and when the flow exceeds 57 cfs between April 1 and September 30.

2.1 Type Of Source Water Used For Recharge

Source water for the recharge project was taken directly from the Little Arkansas River using river-bank infiltration groundwater from the three diversion wells located along the banks of the Little Arkansas River.

2.2 Quantity of Water Available

Based on the daily average flow data from the U.S. Geological Survey (USGS) for the Highway 50 gage, streamflow exceeded the minimum limit for diversion and recharge operations a total of 150 days in 2010.

2.3 Quantity of Water Diverted

A total of 320.83 acre-feet of water was diverted using the three riverbank infiltration diversion wells for recharge purposes during 2010. The quantity of water diverted by each diversion well is summarized in Table 2.1.

2.4 Recharge Techniques Utilized

During 2010, water was recharged to the Basin Storage Area via direct injection through the four Recharge Recovery Wells (RRWs) and via infiltration through Recharge Basin 2 (RB2).

2.5 Quantity Recharged by Each Technique

A total of 316.03 acre-feet was recharged using the four RRWs and RB2 during 2010. The quantity of water recharged by each technique is summarized in Table 2.1. There was a difference of 4.79 acre-feet between the volume diverted and volume recharged to the Basin Storage Area. This difference is due to water spent on system operations such as pipeline flushing. This water was diverted to a drainage ditch and was not metered.

Table 2.1
2010 Metered Diversion, Recharge and Recovery Volumes

	(gallons)	(acre-feet)
Diversions:		
Surface Intake	0	0.00
DW1	26,352,928	80.88
DW2	60,151,568	184.61
DW3	18,030,912	55.34
	Total	320.83
Recharged (metered):		
RB2	4,417,696	13.56
RRW1	10,516,056	32.27
RRW2	21,132,672	64.86
RRW3	26,667,584	81.85
RW1	40,239,152	123.50
	Total	316.03
Recharge Credits Recovered:		
RRW1	0.00	0.00
RRW2	0.00	0.00
RRW3	0.00	0.00
	Total	0.00
Recharge Well Maintenance Pumping[1]:		
RRW1	71,776	0.22
RRW2	157,764	0.48
RRW3	161,793	0.50
RW1	160,069	0.49
	Total	1.69
Surface Water Treatment Plant Operations Water:		
RB1	0	0.00
Water Diverted for System Operations:[2]		
System	1,010,846	4.79

[1]Maintenance pumping is performed periodically to redevelop the wells when recharge efficiency begins to decline. The discharged water is currently sent to Recharge Basin 2. The amounts are deducted from the well recharge credit and are included in Recharge Basin 2 recharge volume.
[2]Water used to flush out the main surface water pipeline and/or drain the pipeline for system deactivation. This water was diverted to a drainage ditch and was not metered.

2.6 Total Quantity of Source Water Stored in Basin Storage Area

The following volumes have been recharged to the Basin Storage Area:

Table 2.2
Total Quantity Recharged to Basin Storage Area.

Volume Recharged to Basin in 2006-2009 (acre-feet)	Volume Recharged to Basin in 2010 (acre-feet)	Total Volume Recharged (acre-feet)
2529.10	316.03	2845.13

2.7 Chemical, Physical, Radiological and Biological Quality of Each Type of Water

Groundwater pumped from the three diversion wells and recharged to the Basin Storage Area was not treated. Therefore the diverted water quality and the stored water quality are the same. Appendix C contains the analytical results obtained from analysis of the samples collected during recharge operations.

2.8 Monthly and Annual Summary of Recharge Credits Withdrawn.

The City summarizes annual withdrawal in the Water Use Report, and monthly on a Supervisory Control and Data Acquisition (SCADA) system report. There has been no recovery of stored water to date, as summarized in Table 2.1.

3.0 HYDROLOGIC CONDITIONS

3.1 Quarterly Index Water Levels

Groundwater Management District No. 2 (GMD2) collects water level measurements on a quarterly basis from the ASR index wells. In addition, the USGS collects water levels annually when they collect groundwater samples from the index wells. These water level data were obtained from the GMD2 and USGS and combined to create a summary table that is included in Appendix D of this report. In addition, water level hydrographs were created and are included in Appendix D to illustrate the changes in water level elevations through time. In addition, a water level change map for the first half of 2010 (July 2010) was created by the USGS and is included in Appendix D this report.

Figures 3.1 and 3.2 are groundwater surface elevation contour maps generated using the GMD2 level "C" index well water level data for January of 2010 and January 2011, respectively. These contour maps illustrate the groundwater potentiometric surface elevations in the deeper monitoring wells in the Basin Storage Area during a low-water-use period, when irrigation and municipal use are typically at their lowest. As shown by these maps, the groundwater flow is generally from the west to the east.

3.2 Key Groundwater Quality Parameters

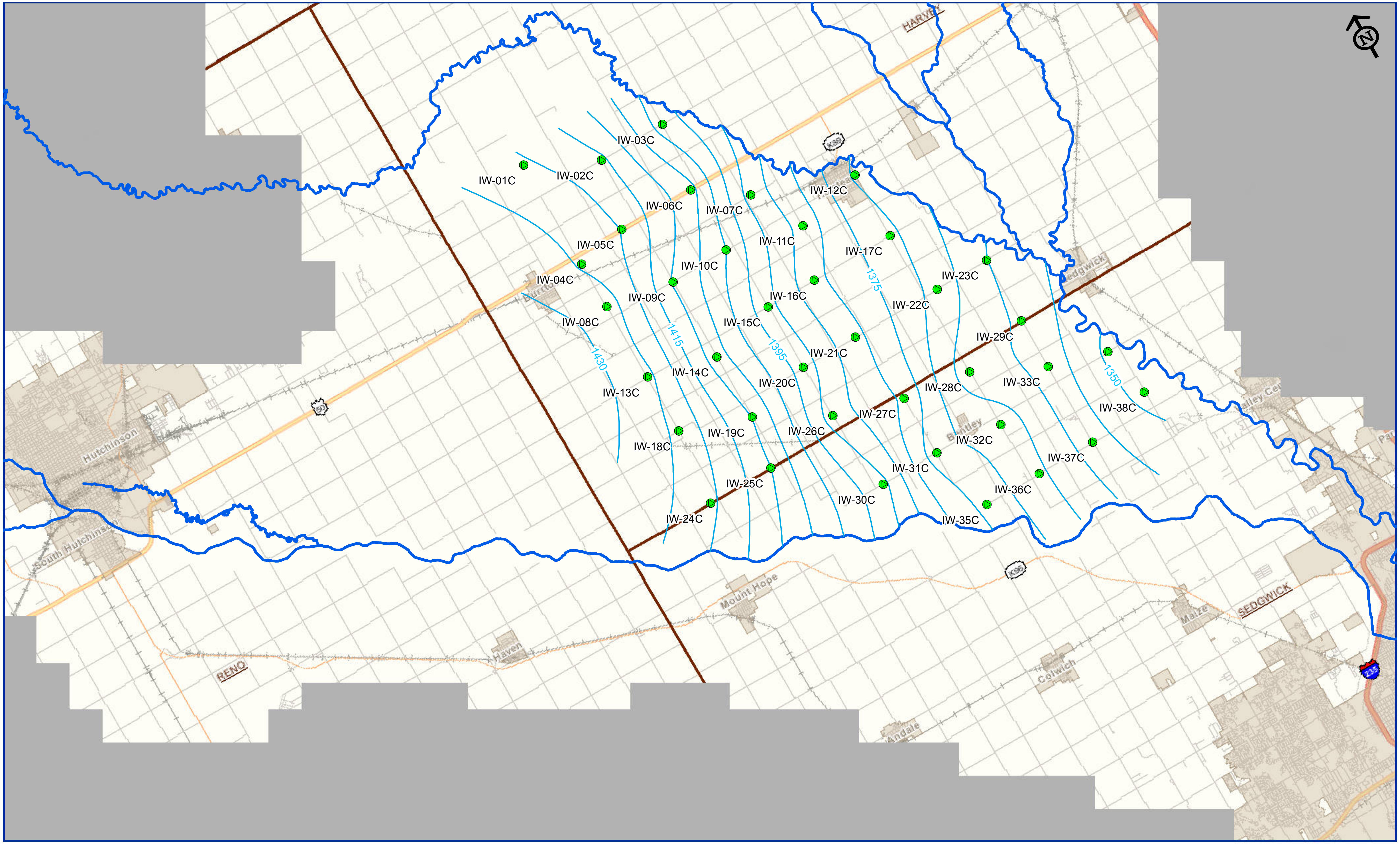
The USGS collects groundwater samples from the index wells on an annual basis. Data tables generated by the USGS containing the complete suite of analytical results from the 2010 sampling can be found at http://ks.water.usgs.gov/studies/equus/equus-bed-aquifer.html. Graphs and tables summarizing several key groundwater quality parameters (alachlor, arsenic, atrazine, chloride, iron, manganese, and nitrate) for each of the index wells are included in Appendix E.

3.3 Monthly and Annual Precipitation Data

The monthly and annual precipitation data was obtained from the GMD2 weather station in Harvey County. This weather station is located in the watershed for the Little Arkansas River, and data from the station is representative of the precipitation in the City wellfield area. Appendix F contains the data from the Harvey County weather station for the 2010 calendar year.

3.4 Withdrawals from Non-domestic Wells

As part of an open files records request, the DWR provides the City with a spreadsheet showing the pumping from all non-domestic wells for use in the annual accounting model. According to the 2010 data



Legend

- Model Streams
- Model Boundary
- Model No-Flow Areas
- IW Contours 2010
- Index Well

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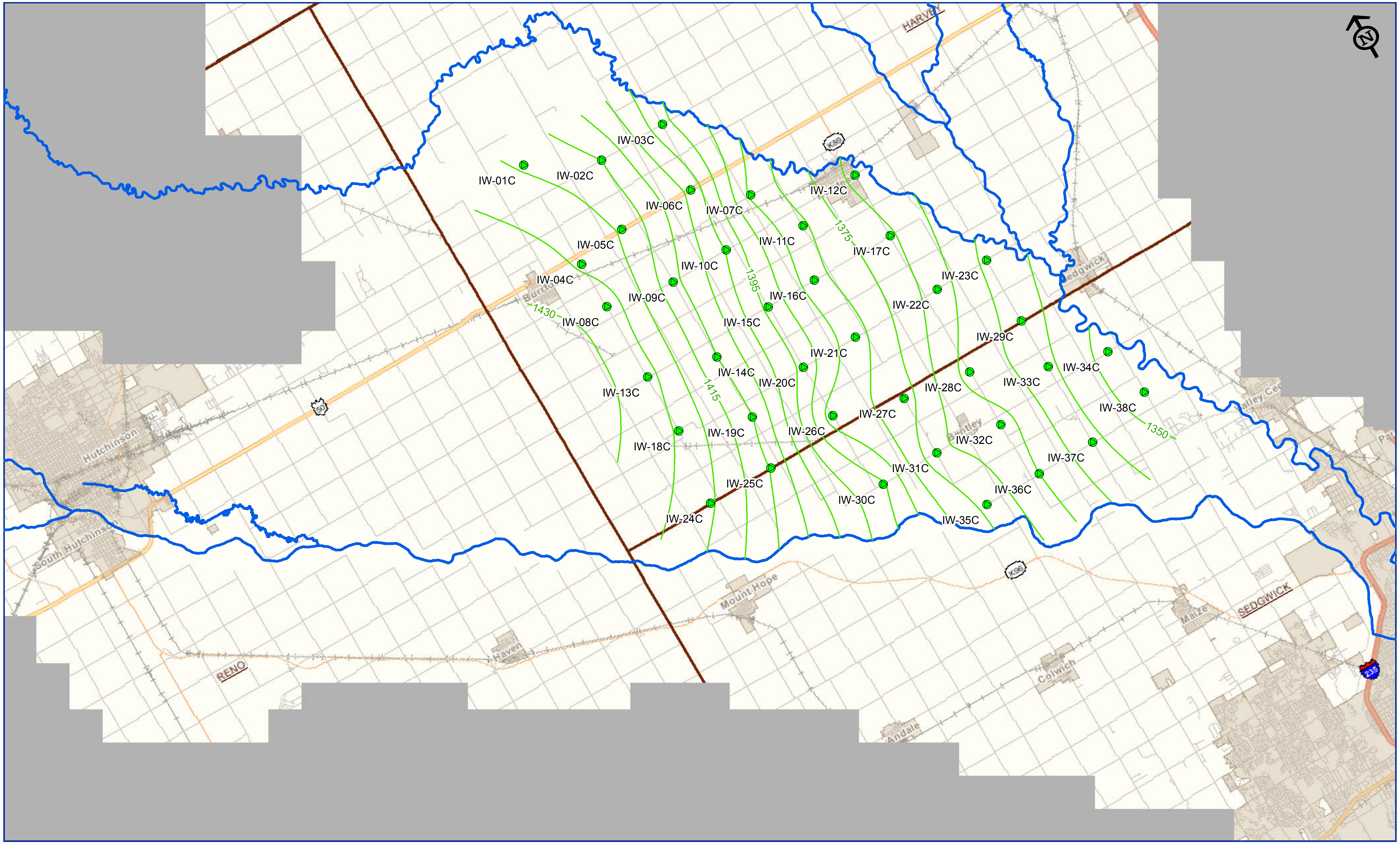
Miles

Burns & McDonnell
SINCE 1898

Figure 3.1
Wichita Accounting Model
Water Level Contours
January 2010



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- Model Streams
- Model Boundary
- Model No-Flow Areas
- IW Contours 2011
- Index Well

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Miles

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Figure 3.2
Wichita Accounting Model
Water Level Contours
January 2011

provided by DWR, a total of 19,734,715 acre-feet was pumped from non-domestic wells in the Basin Storage Area in 2010. The pumping data is included in Appendix H.

3.5 Annual Streamflow, Including Baseflow and Above Baseflow Stage

The annual streamflow data for the Little Arkansas River for 2010 was obtained from the USGS. The daily values reported by the USGS for stage and flow at the Highway 50 gage are included as Appendix I. Figure 3.1 illustrates the flow in the river and also the time periods that the diversion wells were in operation. There were three periods during June and July of 2010 where the flow exceeded the 800 cfs value shown on the vertical axis of the graph; however, to illustrate the data in greater detail the axis maximum was set at 800 cfs.

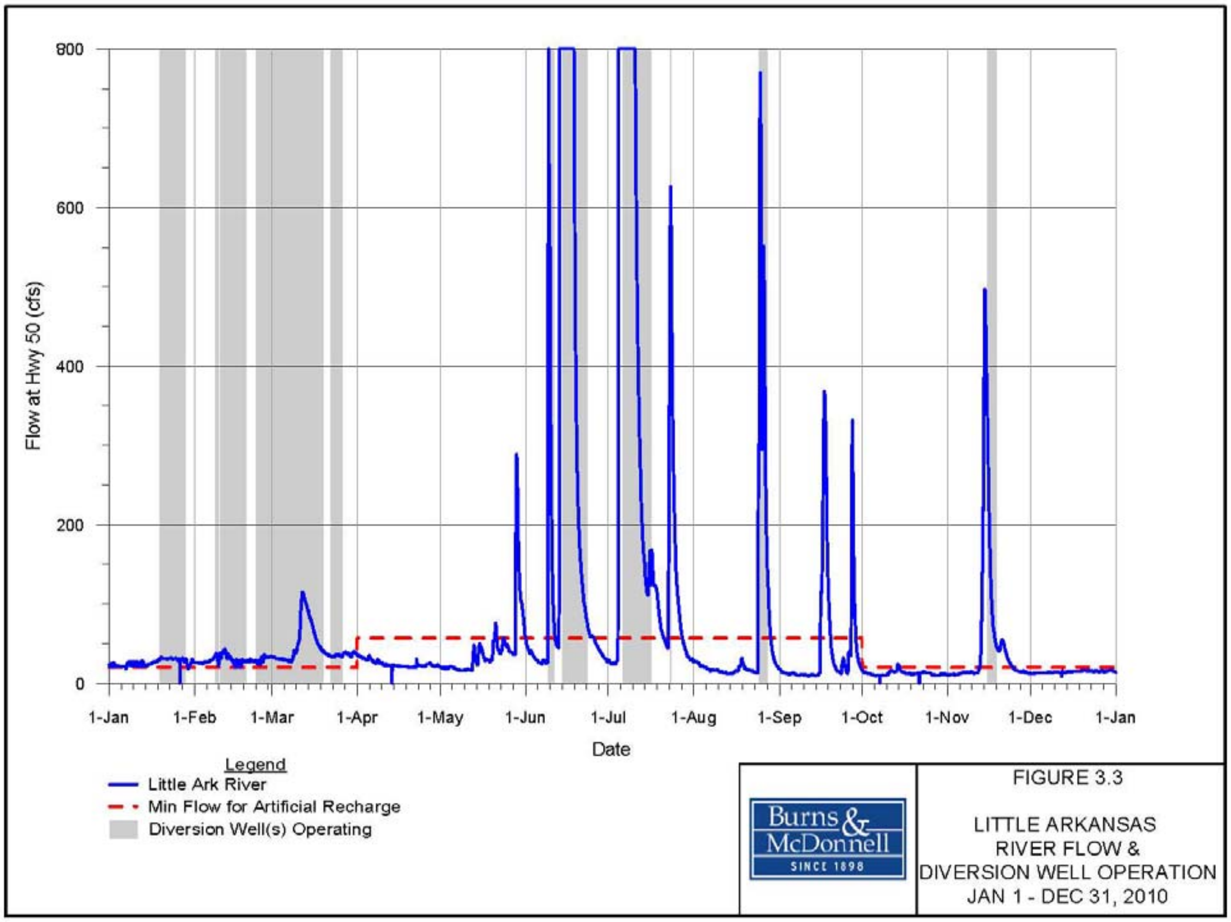


FIGURE 3.3

LITTLE ARKANSAS RIVER FLOW & DIVERSION WELL OPERATION JAN 1 - DEC 31, 2010

3.6 Summary of Conjunctive Use Amounts

Conjunctive use amounts are totaled when the City uses more than its base water rights of 53,000 acre-feet from Cheney during wet years. This did not happen in 2010, so the conjunctive use amount is 0.0 acre-feet.

3.7 Water Supply and Demand Forecast for the Next Three Years

The City pumped a total of 20,694,434,000 gallons (63,513 acre-feet) of water from all of their supply wells in 2010. City pumping has remained fairly consistent, but irrigation pumping has been reduced in the wellfield area for the last three years due to the relatively wet weather. The projected City water demand for the next three years is:

Table 3.1
City of Wichita Three-Year Projected Water Demand.

Year	Gallons	Acre-feet
2011	21,900,000,000	67,213
2012	22,630,000,000	69,454
2013	22,856,000,000	70,148

The City's current water supplies are anticipated to meet the projected demands, and no ASR credits are anticipated to be used in the next three years.

* * * * *

4.0 GROUNDWATER MODELING

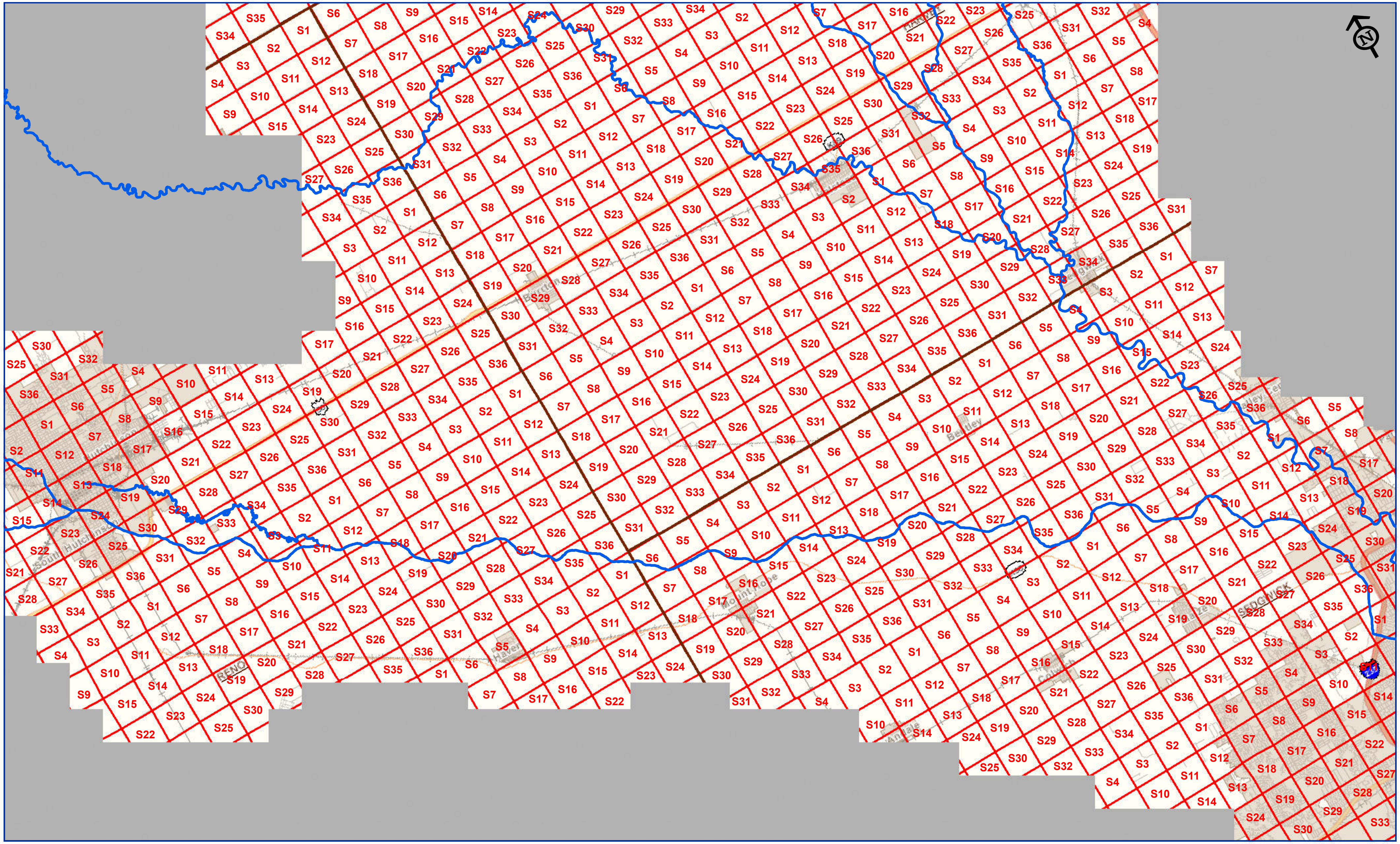
4.1 Background

DWR requires a groundwater model-based accounting system to track movement of recharge credits as a condition for approval of permits required to capture, store and recover water for beneficial use by the City. The MODFLOW groundwater model currently in use has been extensively modified from a model originally developed by the USGS office in Lawrence, Kansas to study stream-aquifer interaction between the Arkansas River and the *Equus* Beds aquifer. The USGS model area included the current study area along the Little Arkansas River. The location and extent of the accounting model area is shown in Figure 4.1.

The USGS model used constant-head nodes along the margins of the model boundary to represent areas where the aquifer extends beyond the model boundary. No-flow boundaries represent areas where shale provides a natural barrier to groundwater flow. The model included areal recharge, evapotranspiration, stream flow and well pumpage. More extensive details of the USGS model including information regarding model set-up, calibration, sensitivity analysis and model results are contained in "Hydrologic and Chemical Interaction of the Arkansas River and the *Equus* Beds Aquifer Between Hutchinson and Wichita, South-Central Kansas," USGS Water-Resources Investigation Report 95-4191 (Myers, et al, 1995).

The USGS model was refined by the U.S. Bureau of Reclamation (USBR) to assist the GMD2 with an analysis of chloride migration in the Burrton, Kansas area. In order to improve the accuracy of the transport modeling, the USBR model had reduced grid spacing and adjusted the grid cells to a more uniform dimension. Details of the USBR modeling are given in "Arkansas River Water Management Improvement Study, Modeling of Chloride Transport in the *Equus* Beds Aquifer" (Pruitt, 1993).

The USBR model was subsequently modified and further refined by Burns & McDonnell for use as the accounting model required by the DWR to evaluate the City's Aquifer Storage and Recovery project. Because the primary area of interest during the initial ASR Investigation was the Wichita well field, the accounting model was re-gridded by Burns & McDonnell to provide better resolution in this area.



Legend

- Model Streams
- Model Boundary
- Model No-Flow Areas

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Miles

Burns & McDonnell
SINCE 1898

Figure 4.1
Wichita Accounting Model
Area Map

4.2 Model Implementation for ASR Accounting

DWR requires that ASR accounting utilize groundwater modeling to track movement of recharged water within the index cells previously established. Wichita's ASR Basin Storage Area is not a closed basin and groundwater migrates down-gradient from higher water table elevations in the west to lower elevations in the east, eventually discharging to the Little Arkansas River. Water recharged in one index cell that is not removed by pumping will eventually migrate to down-gradient index cells. This migration depends on the local gradient which is influenced by natural recharge, municipal and irrigation pumping, and the amount of ASR recharge. Groundwater modeling has been proven to effectively quantify the groundwater movement. However, modeling cannot directly track the movement of recharge credits from one index cell to another and keep it separate from movement of non-recharge water.

In order to track recharge credits, two model runs are implemented, one with the complete ASR recharge and recovery operational history and a second run assuming no ASR recharge or diversion well production. Since the only difference between the two model runs is the water recharged (and recovered), the differences in the water budget between the two model runs are assumed to be due to the impact of ASR operation. For example, if the net underflow (flow from one index cell to another) is greater with the ASR model run, the additional underflow is assumed to be due to ASR operation.

Flows to and from each index cell are added and subtracted to effectively track the migration of ASR credit. Recharge credits that are lost to the Little Arkansas River are deducted from the total recharge credits available.

4.3 Model Setup and Implementation

The accounting model used for the Wichita ASR accounting has been upgraded and refined with data acquired during various phases of investigation for the ASR project. The current model configuration is a uniform cell size of 500 feet by 500 feet, resulting in a model with 253 rows and 420 columns, and three layers. Modifications completed for the 2010 accounting runs were limited to the addition of a stress period to model 2010 and the addition of data for that year. No additional refinements were made to the model in anticipation of the revised and updated model that the USGS intends to publish in 2012.

The 2010 model simulates 2003 flows under steady-state conditions, and transient flow conditions for years 2004 through 2010. The model units are feet, cubic feet and days. Unless otherwise noted below, units are model units.

Details of the water budgets and groundwater modeling to support the ASR recharge credits claimed are presented in the following sections.

4.4 Basin Storage Area Stresses for Model Input

4.4.1 Precipitation and Recharge

A percentage of annual precipitation contributes to natural recharge. The USGS model used average precipitation from three area weather stations (Hutchinson, Mount Hope, Wichita Mid-Continent) and then distributed the recharge across the model area based on soil type, ground cover and model calibration. Additional data from a fourth station was included to provide a better distribution of the precipitation sampling area when a new station was added at Newton. The current model employs data from these same four locations. In 2010 the calculated average rainfall in the Basin Storage Area was 31.48 inches. The calculated natural recharge for each index cell is shown in the model water budget summaries contained in Appendix A.

4.4.2 Streamflow

Streamflow can contribute to aquifer recharge depending on river stage, river bed conductivity, and elevation of the underlying groundwater table. Variations in river stage and flow are considered in the groundwater model using the MODFLOW stream package in which a starting flow is assigned to the upstream river node with MODFLOW assigning river flow and stage in downstream nodes. The USGS model calculated the appropriate starting river flow and baseflow using a 70 percent return interval within the modeled stress period. Table 4.1 summarizes the modeled stream flows in the upstream river node for each year of the model.

Table 4.1
Model Simulated Stream Flows

	Flow, in cubic feet per second (cfs)							
Stream Name	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Arkansas River	110	121	127	77	269	355	302	233
Little Arkansas River	13	12	9.1	2.4	8.6	27	19	13
Cow Creek	10	10	10	10	10	10	10	10
Sand Creek	1	1	1	1	1	1	1	1
East Emma Creek	1	1	1	1	1	1	1	1
West Emma Creek	1	1	1	1	1	1	1	1
Emma Creek	*Emma Creek flow was calculated by the model as the outflow from East & West Emma Creeks*							

4.4.3 Groundwater Pumping

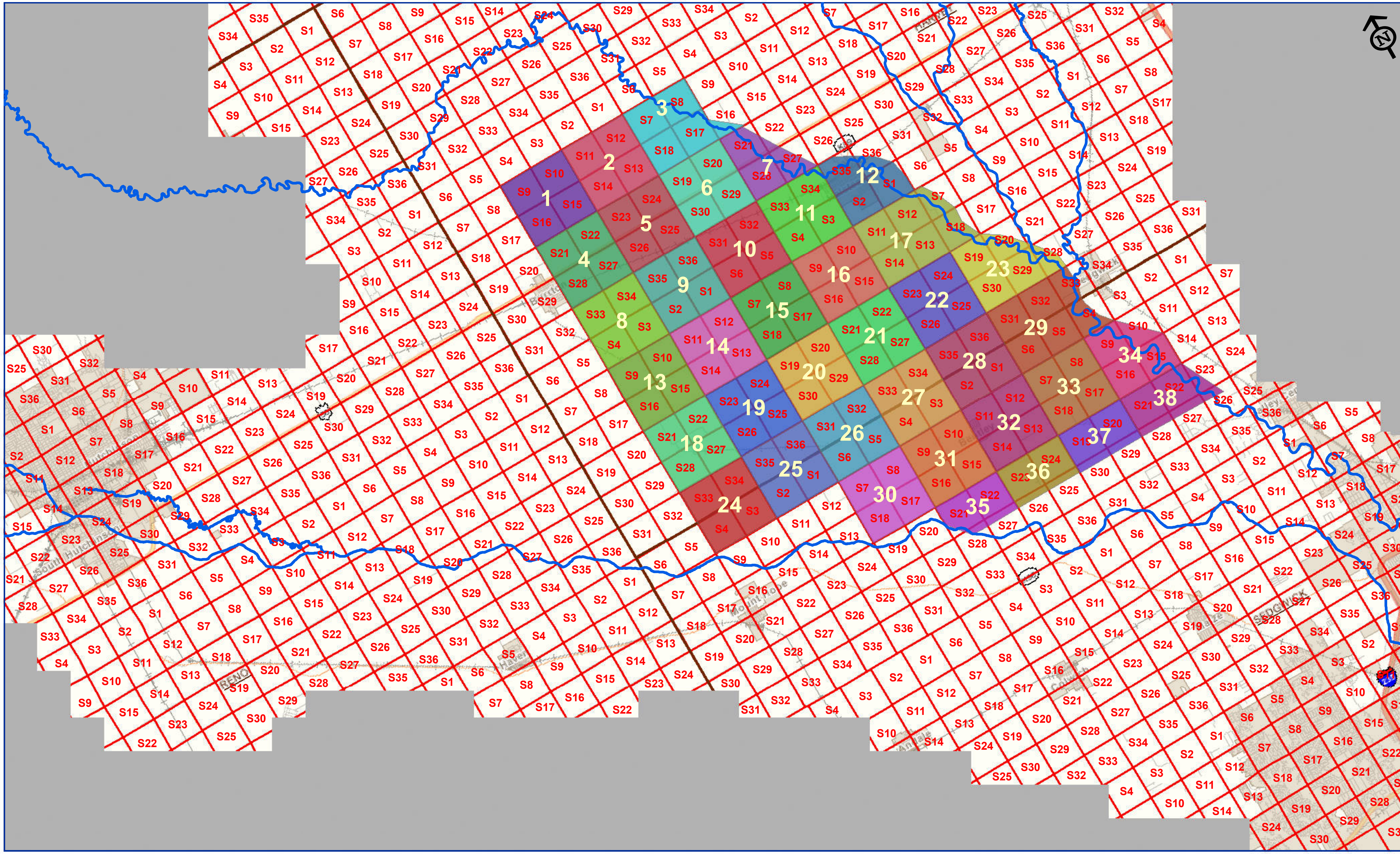
Water use data for 2010 was obtained from DWR. Water use reported in acre-ft by DWR was converted to average daily pumping rates and distributed evenly throughout the year. Well locations reported in geographic coordinates (latitude and longitude) were converted to model coordinates. The converted data was then imported into the model.

4.5 Model Calibration

The steady-state runs of the current accounting model have a budget mass balance discrepancy of 0.0048 percent (less than the industry standard of 0.1 percent), and a total mass balance discrepancy for steady-state and transient time steps of -0.0029 percent. Comparison of the calculated water levels in the model to 358 selected index well water level targets from 2003 through 2010 results in a residual mean of -0.12 feet and absolute residual mean of 3.84 feet. The absolute residual mean is the average absolute difference between measured water levels and computed water levels at the same location. The current model uses the index wells screened in Layer 3 of the model for targets. Calibration differences between the original USGS model and the current model are due to different monitoring wells being used for targets, seasonal variations in local weather (recharge), timing of local pumping, changes in grid spacing, and other operational factors. Appendix B contains a summary water budget for the model runs.

4.6 Model Water Budget

MODFLOW permits tracking of groundwater flow throughout the model. This includes flows into and out of the model, flows between cells within the model, and changes in storage on a cell-by-cell basis. With the processing software (Groundwater Vistas) a group of model cells may be combined into a hydrostratigraphic unit, for which a composite water budget can be calculated. For the accounting model, a total of 39 hydrostratigraphic units were established and numbered to represent the 38 ASR index cell areas and one hydrostratigraphic unit to represent the area outside the Index Cells. For most of the model, the model hydrostratigraphic units roughly match the actual cells; however, on the eastern side of the Basin Storage Area, the Little Arkansas River was not included in an index cell boundary. Because river interaction is an important element for complete accounting, several index cells were extended eastward in the model to include the river. A map depicting the modeled hydrostratigraphic units (index cells) is shown in Figure 4.2.



Legend

- Model Streams
- Model Boundary
- Model No-Flow Areas
- Index Cell (colors vary)

0 — 8 Miles

Burns & McDonnell SINCE 1898

Figure 4.2
Wichita Accounting Model
Index Map

A water balance report was generated using Groundwater Vistas. The water balance reports for the model runs with and without ASR are combined to show net changes in the water budget which are reported in the Index Cell Water Budget Summaries provided in Appendix A. A copy of the detailed reports both with and without ASR activities is included in Appendix B.

4.7 Specific Water Budget Components

4.7.1 Natural and Artificial Recharge

4.7.1.1 *Natural Recharge*

The amount of natural recharge entering an aquifer system is based on many factors including the amount of precipitation, surface soil texture, slope, and type and amount of groundcover. The GMD2 has determined that approximately 20 percent of rainfall is recharged to the aquifer. The USGS groundwater model used average rainfall from Wichita, Hutchison, and Mount Hope for model input. Since that time, an additional weather station in Newton has become available and has been added into the calculation. The accounting model estimates of the recharge rate range from approximately 16 to 28 percent of the annual precipitation amount.

The USGS distributed natural recharge across the model based on soil type and other factors. The current model retains the distribution developed by the USGS with the amount adjusted for the average annual precipitation total for each year. Table 4.2 summarizes the natural recharge data simulated in the model.

Table 4.2
Modeled Average Annual Precipitation

	Annual Precipitation (inches)							
Station	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Hutchinson	35.42	34.87	40.26	28.14	44.35	39.15	32.45	31.17
Mount Hope	27.64	39.81	36.97	26.47	36.74	38.26	35.63	34.63
Wichita Mid-Continent	32.60	37.55	36.72	28.59	37.98	53.84	37.55	28.78
Newton	36.05	33.56	36.18	17.15	35.93	38.60	35.66	31.33
average	32.93	36.45	37.53	25.09	38.75	42.46	35.32	31.48

The modeled amount of recharge for each index cell is shown in the model water budget summaries presented in Appendix A.

4.7.1.2 *Artificial Recharge*

The metered volume of water recharged through the basins and recharge wells in 2010 was 316.03 acre-feet. Table 2.1 contains a summary showing the volume recharged through each of the RRWs and RB2. For the groundwater model, water recharged by wells or basins is considered to be well pumpage into the aquifer (both wells and basins).

4.7.2 Groundwater Inflow and Outflow

Groundwater inflow and outflow is the amount of groundwater or underflow migrating into an index cell from other areas and flowing out of an index cell to other areas. The net underflow, positive or negative, is shown in the model water budget summaries for water movement between index cells (Appendix B) or areas outside of the recharge basin area.

4.7.3 Evaporation and Transpiration

Evapotranspiration is estimated in the model. Earlier USGS studies estimated maximum evapotranspiration to be approximately 3.5 in/yr. The model incorporates a maximum value of 3.5 in/yr when the water table is at the surface. The rate is reduced with deeper groundwater level and is 0 when the water table is below 10 feet from the surface. Estimates of evapotranspiration are given for each index cell in the model water budgets.

4.7.4 Groundwater Diversions from Non-Domestic Wells

Groundwater diversions from all non-domestic wells are obtained from DWR in an electronic spreadsheet format. The well location and annual pumping for each water right is provided, and these are incorporated into the model. Well pumpage is provided to DWR from annual well reports required of all permitted owners. The volume pumped for each well is converted to units of cubic feet per day, and applied as an average daily pumpage for each year in the model. The data provided by DWR is provided in Appendix H.

The amount of pumpage within each index cell is shown in the model water budget summaries provided in Appendix B. The volume shown in the summary is the net volume for the cell (pumpage minus volume recharged).

4.7.5 Infiltration from Streams

When aquifer water elevations are lower than surface water elevations in a stream, there is a potential for water to infiltrate into the aquifer from the stream. The amount of flow depends on the difference in water levels and the permeability of the streambed. Using the calibrated model, estimates of net flow (water leaving the stream minus water entering the stream) are estimated for each index cell that has a river reach.

Infiltration from the Little Arkansas River throughout the Basin Storage Area was approximately 841 acre-feet, and from the Arkansas River approximately 1353 acre-feet. Only index cell 35 includes Arkansas River inflows. The estimates are shown in the model index cell water budget.

4.7.6 Groundwater Discharge to Streams

When aquifer water elevations are higher than the surface water elevation in a stream, there is a potential for water to infiltrate from the aquifer into the stream. The amount of flow depends on the difference in water levels and the permeability of the streambed. Using the calibrated USGS model, estimates of net flow (water leaving the stream minus water entering the stream) is estimated for each index cell that has a river reach.

The model shows that a total of 41,987 acre-feet of water migrated from the aquifer in the Basin Storage Area to the Little Arkansas River in 2010. This accounts for about 57.9 cfs of the average annual flow of 367.5 cfs recorded at the Sedgwick gage for the year. The Sedgwick gage is located approximately at the southeast corner of the Basin Storage Area, and illustrates the flow in the Little Arkansas River downstream of the recharge area. The estimates are shown in the model index cell water budget.

4.8 Calculated Recharge Credits

Calculated recharge credits are based on the following for each index cell:

	Previous recharge credit
+	metered additional recharge
-	recharge credits recovered for use or maintenance
+	recharge credits entering by underflow (modeled)
-	recharge credits leaving by underflow or flow to river (modeled)
=	current recharge credit

Some differences in the water budgets with ASR and without ASR are excluded from the recharge credit calculations. For example, increases in storage in index cells 1, 4, 8, and 13 do not count toward the recharge credit total. These four cells are up-gradient of index cells 2, 5, 9 and 14, where active recharge activities are taking place. The increases in storage in these up-gradient index cells (1, 4, 8, and 13) is not a recharge credit, because it is not recharged water , but is a result of increasing water levels due to the mounding effect of water being injected. The net result of this effect is that water that would have migrated down-gradient stays in the up-gradient index cells, resulting in higher water levels and increased water in storage in the up-gradient (non-recharge) cell. This reduction in flow down-gradient indicates that the barrier to the Burton Salt Water Plume is forming.

A summary of the calculated recharge credits is presented in Table 4.3.

Table 4.3
2010 Recharge Credit Summary
(Acre-Feet)

Index Cell No.	Previous Recharge Credit (2006-2009)	2010 Metered Recharge	2010 Metered Recovery	Net Recharge Credit Underflow Entering Index Cell	Net Recharge Credit Underflow Leaving Index Cell	Net Recharge Credit Loss to River	Current Recharge Credit
1	----			----	----	----	----
2	203.7	32.3	0.2	68.6	88.9	----	215.4
3	171.5			154.2	154.6	0.0	171.1
4	----			----	----	----	----
5	266.6	146.7	1.0	37.3	142.0	----	307.5
6	52.2			144.1	144.1	----	52.1
7	97.2			82.2	13.9	67.6	97.9
8	----			----	----	----	----
9	268.6	123.5	0.5	-10.7	79.8	----	301.1
10	60.7			65.2	65.2	----	60.7
11	31.3			51.4	42.1	9.2	31.4
12	6.2			17.6	3.9	13.6	6.3
13	----			----	----	----	----
14	331.4	13.6	0.0	-12.6	-9.2	----	341.5
15	52.7			23.6	23.7	----	52.7
16	31.4			32.8	32.8	----	31.4
17	9.9			23.6	15.0	8.3	10.2
18	----			----	----	----	----
19	41.0			-6.6	-12.5	----	46.9
20	28.1			9.2	9.1	----	28.2
21	20.3			20.5	20.5	----	20.3
22	8.1			14.5	14.4	----	8.1
23	2.0			7.1	3.6	3.4	2.1
24	----			----	----	----	----
25	8.9			5.5	-8.8	----	23.1
26	2.7			9.0	2.4	----	9.4
27	9.4			8.5	8.3	----	9.6
28	4.8			6.6	6.6	----	4.8
29	1.7			3.9	3.1	0.8	1.7
30	2.0			4.4	-2.2	----	8.6
31	2.8			3.0	2.7	----	3.1
32	1.7			2.5	2.5	----	1.7
33	0.8			1.7	1.7	----	0.8
34	0.1			0.7	0.2	0.6	0.1
35	0.8			0.8	-1.5	0.1	3.0
36	0.4			0.7	0.1	----	1.1
37	0.2			0.5	0.3	----	0.3
38	0.0			0.2	0.1	0.0	0.0
Total	1719.4	316.0	1.7	769.8	847.4	103.6	1852.4

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