UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 7
11201 Renner Boulevard
Lenexa, Kansas 66219

19 AUG 2015

Dr. Susan Mosier
Interim Secretary
Kansas Department of Health and Environment
1000 S.W. Jackson, Suite 540
Topeka, Kansas 66612-1368

Dear Dr. Mosier:

RE: Approval of TMDL document for the Walnut and Whitewater Rivers

This letter responds to the submission from the Kansas Department of Health and Environment, originally received by the U.S. Environmental Protection Agency, Region 7, on September 29, 2014, for a Total Maximum Daily Load document which contained TMDLs for total phosphorus. The Walnut and Whitewater Rivers and their tributaries were identified on the 2014 Kansas Section 303(d) list as impaired. This submission fulfills the Clean Water Act statutory requirement to develop TMDLs for impairments listed on a state's § 303(d) list. The specific impairments (water body segments and causes) are:

Water Body Name	WBID	Cause
Whitewater River	KS-WA-17-038_18	Total Phosphorus,
Whitewater River	KS-WA-17-038_19	Total Phosphorus
Fourmile Creek	KS-WA-18-038_20	Total Phosphorus
Whitewater River	KS-WA-18-038_21	Total Phosphorus
Whitewater River, West Branch	KS-WA-17-038_22	Total Phosphorus
Whitewater River	KS-WA-17-038_23	Total Phosphorus
Whitewater River, West Branch	KS-WA-17-038_24	Total Phosphorus
Whitewater River, West Branch	KS-WA-17-038_25	Total Phosphorus
Wildcat Creek	KS-WA-17-038_26	Total Phosphorus
Wildcat Creek, West	KS-WA-17-038_28	Total Phosphorus
Sand Creek	KS-WA-17-038_29	Total Phosphorus
Gypsum Creek	KS-WA-17-038_30	Total Phosphorus
Whitewater Creek, East Branch	KS-WA-17-038_31	Total Phosphorus
Dry Creek	KS-WA-17-038_32	Total Phosphorus
Henry Creek	KS-WA-17-038_33	Total Phosphorus
Whitewater Creek	KS-WA-17-038_34	Total Phosphorus
Prairie Creek	KS-WA-17-038_35	Total Phosphorus
Rock Creek	KS-WA-17-038_37	Total Phosphorus
Walnut Creek	KS-WA-17-038_44	Total Phosphorus
Walnut River	KS-WA-18-106_14	Total Phosphorus
Whitewater River	KS-WA-18-106_17	Total Phosphorus
Dry Creek	KS-WA-18-106_27	Total Phosphorus
Badger Creek	KS-WA-18-106_36	Total Phosphorus
Sutton Creek	KS-WA-18-106_40	Total Phosphorus
Elm Creek	KS-WA-18-106_43	Total Phosphorus
Walnut River	KS-WA-18-279_2	Total Phosphorus, low Dissolved Oxygen
Walnut River	KS-WA-18-279_3	Total Phosphorus, low Dissolved Oxygen

Walnut River, West Branch	KS-WA-18-279_16	Total Phosphorus, low Dissolved Oxygen
Constant Creek	KS-WA-18-279_41	Total Phosphorus, low Dissolved Oxygen
Bird Creek	KS-WA-18-279_213	Total Phosphorus, low Dissolved Oxygen
Fourmile Creek	KS-WA-18-744_16	Total Phosphorus
Spring Branch	KS-WA-18-744_32	Total Phosphorus

The EPA has completed its review of the TMDL document with supporting documentation and information. By this letter, the EPA approves the submitted TMDLs. Enclosed with this letter is the Region 7 TMDL Decision Document which summarizes the rationale for the EPA's approval of the TMDL document. The EPA believes the separate elements of the TMDLs described in the enclosed document adequately address the causes of concern, taking into consideration seasonal variation and a margin of safety.

Although the EPA does not approve the monitoring or implementation plans submitted by the state, the EPA acknowledges the state's efforts. The EPA understands that the state may use the monitoring plan to gauge the effectiveness of the TMDLs and determine if future revisions are necessary or appropriate to meet applicable water quality standards. The EPA recognizes that technical guidance and support are critical to determining the feasibility of and achieving the goals outlined in the TMDL document.

Therefore, the implementation plan in this TMDL document provides information regarding implementation efforts to achieve the loading reductions identified.

The EPA is currently in consultation under Section 7 of the Endangered Species Act with the U.S. Fish and Wildlife Service regarding this TMDL document. While we are approving the TMDLs at the present time, we may decide that changes to the TMDL document are warranted based upon the results of the consultation when it is completed.

The EPA appreciates the thoughtful effort that the KDHE has put into the TMDL document. We will continue to cooperate with and assist, as appropriate, in future efforts by the KDHE to develop TMDLs.

Sincerely,

Karen A. Flournoy
Director
Water, Wetlands and Pesticides Division

Enclosure

cc: Mr. John Mitchell, Director, Division of Environment, KDHE
Mr. Tom Stiles, Chief, Watershed Planning, Monitoring and Assessment Section, KDHE

EPA Region 7 TMDL Review

TMDL ID: KS-WA-17-279_2 **State:** KS

Document Name: WALNUT R

Basin(s): WALNUT RIVER BASIN

HUC(s): 11030017, 11030018

Water body(ies): BADGER CR, BIRD CR, CONSTANT CR, DRY CR, ELM CR, FOURMILE CR, GYPSUM CR, HENRY CR, PRAIRIE CR, ROCK CR, SAND CR, SPRING BRANCH, SUTTON CR, WALNUT CR, WALNUT R, WALNUT R, W BR, WHITEWATER CR, WHITEWATER CR, E BR, WHITEWATER R, WHITEWATER R, E BR, WHITEWATER R, W BR, WILDCAT CR, WILDCAT CR, WEST

Tributary(ies): BADGER CREEK, DRY CREEK, ELM CREEK, FOUR MILE CREEK, GYPSUM CREEK (30), PRAIRIE CREEK, SPRING BRANCH, WHITEWATER CREEK, WILDCAT CREEK

Cause(s): BIOLOGICAL INTEGRITY, DISSOLVED OXYGEN, PHOSPHORUS, TOTAL

Submittal Date: 9/29/2014 **Approved:** Yes

Submittal Letter and Total Maximum Daily Load Revisions

The state submittal letter indicates final TMDL(s) for specific pollutant(s) and water(s) were adopted by the state, and submitted to the EPA for approval under Section 303(d) of the Clean Water Act [40 CFR § 130.7(c)(1)]. Include date submitted letter was received by the EPA, date of receipt of any revisions and the date of original approval if submittal is a revised TMDL document.

The Kansas Department of Health and Environment formally submitted the TMDL document to the U.S. Environmental Protection Agency in an email dated September 29, 2014. In response to the EPA comments, the KDHE submitted a final revised TMDL document to the EPA in an email dated March 23, 2015.

Water Quality Standards Attainment

The targeted pollutant is validated and identified through assessment and data. The water body's loading capacity for the applicable pollutant is identified and the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources is described. The TMDL(s) and associated allocations are set at levels adequate to result in attainment of applicable water quality standards [40 CFR § 130.7(c)(1)]. A statement that the WQS will be attained is made.

Phosphorus levels in the Whitewater River, the Walnut River (monitoring station SC279; segment 14 of the Kansas Surface Water Register), Fourmile Creek (SC744; segment 20) and the Walnut River (SC106; segment 2 and 3) are consistently high. Excessive nutrients are not being controlled and are thus impairing aquatic life, domestic water supply and contact recreation. Dissolved oxygen deficiencies in the Walnut River near El Dorado are also potentially impairing aquatic life by falling below the Kansas water quality standard of 5.0 milligrams per liter.

The following data sources were used to assess water quality and develop the TMDL document.

Rotational monitoring stations:

SC038 - active KDHE permanent station located on the Whitewater River at the K-254 Highway Bridge one-half mile west of Towanda. Period of record: March 20, 1990, through September 17, 2013. Total phosphorus impairment: 2008, 2010, 2012 and 2014.

SC279 - active KDHE permanent station located on the Walnut River at a county road bridge 4.5 miles south of El Dorado. Period of record: March 20, 1990, through September 17, 2013. Total phosphorus impairment: 2008, 2010, 2012 and 2014. Dissolved oxygen impairment: 2012 and 2014.

SC744 - active KDHE rotational station located on Fourmile Creek at a county road bridge 2.1 miles west and 2.2 miles north of Gordon. Period of record: March 22, 2005, through October 18, 2011. Total phosphorus impairment: 2010, 2012 and 2014.

SC106 - active KDHE permanent station located on the Walnut River at a county road bridge one-half mile west of Gordon. Period of record: March 20,1990, through September 16, 2013. Total phosphorus impairment: 2008, 2010, 2012 and 2014.

Probabilistic monitoring stations:

SPA100 - the KDHE Stream Probabilistic Station on Bird Creek. Period of record: March, 13, 2007, through November 27, 2012.

SPB118 - the KDHE Stream Probabilistic Station on the Whitewater River. Period of record: February 28, 2011, through October 11, 2011.

SPB158 - the KDHE Stream Probabilistic Station on Dry Creek. Period of record: January 25, 2011, through October 18, 2011.

SPB166 - the KDHE Stream Probabilistic Station on the Whitewater River. Period of Record: February 28, 2011 through October 18, 2011.

SPB230 - the KDHE Stream Probabilistic Station on the West Branch, Walnut River. Period of record: February 28, 2012, through November 27, 2012.

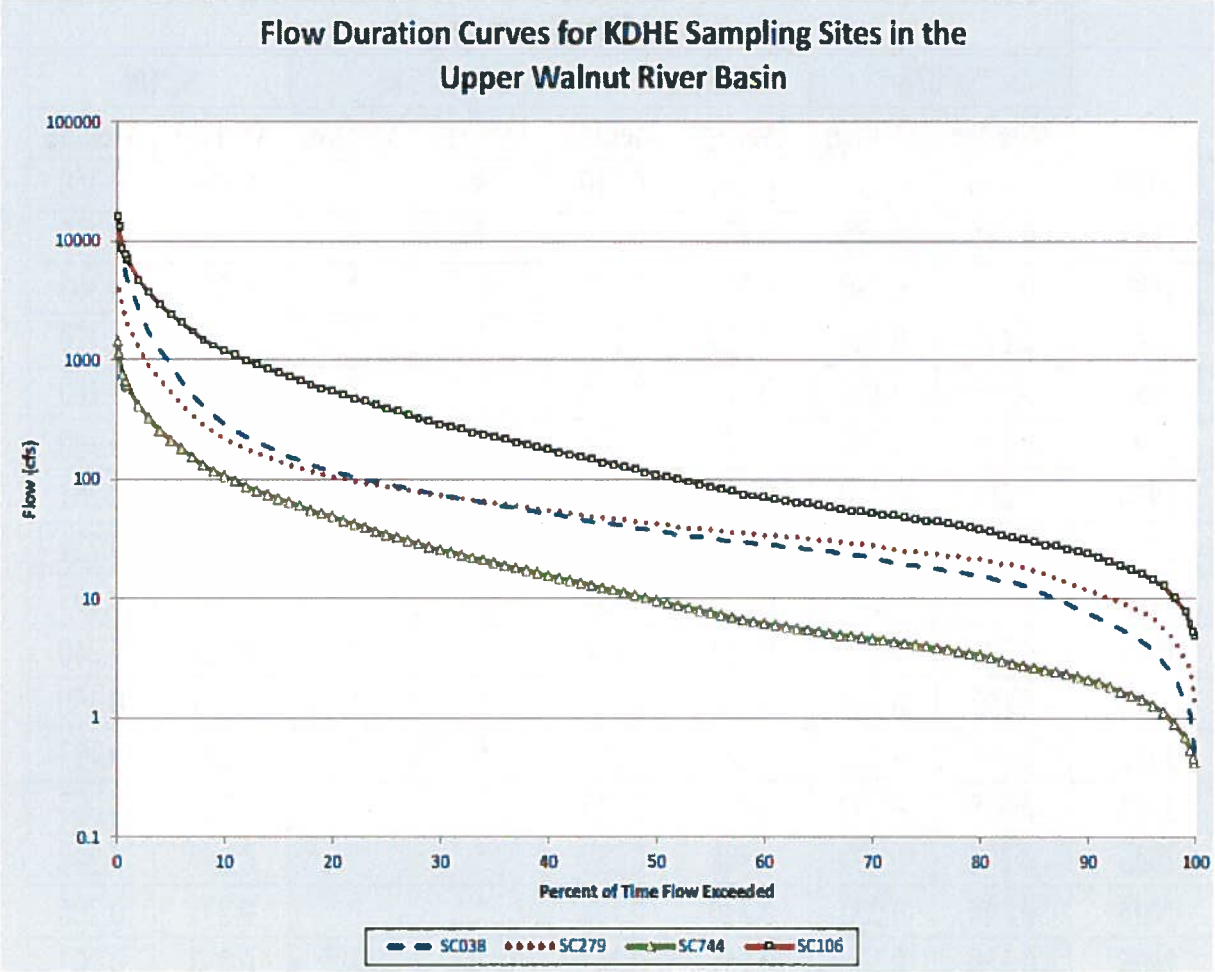
Stream biological monitoring stations:

SB038 - the KDHE Stream Biological Station on the Whitewater River at the K-254 Highway Bridge one-half mile west of Towanda. Period of record: one sample on May 3, 1990.

SB279 - the KDHE Stream Biological Station on the Walnut River at a county road bridge 4.5 miles south of El Dorado. Period of record: one sample on September 17, 1993.

SB106 - the KDHE Stream Biological Station located on the Walnut River at a county road bridge one-half mile west of Gordon. Period of record: May 2, 1990, through July 26, 2012.

The U.S. Geological Survey gage 07147070 (period of record: January 1, 1990, through December 31, 2013) located at SC038 on the Whitewater River near Towanda was used to establish flows at SC038, as well as at SC744 by adjusting for the difference in watershed areas. Flows for the contributing area at SC106 as well as the flow for the Whitewater/Upper Walnut River watershed with SC106 as the outlet were determined using the ratio of the watershed area at USGS gage 07147800 (January 1, 1990, through December 31, 2013), located downstream from the watershed on the Walnut River at Winfield. To determine flows at SC279 a regression calculation utilizing the common period for USGS gages 07147070 and 07146830 (October 1, 1981, through September 30, 1998) was developed and applied to flow conditions at USGS gage 07147070. The ratio of the watershed area at USGS gage 07147070 to the watershed area at SC279 was then applied to regression generated flows.



In addition to these flow duration curves, flow conditions at the USGS gages used to estimate flow at the KDHE sampling stations and the resulting flow values at stations are in Table 2 of the TMDL document at the 90 percent, 75 percent, 50 percent, 25 percent and 10 percent flow exceedances. Table 7 of the TMDL document depicts the TP mass balance at sampling stations in the Upper Walnut River Basin. Total phosphorus concentrations for 25 percent, 50 percent and 75 percent flow percentiles were determined by averaging the samples collected while the stream was at 10-24 percent, 25-74 percent and 75-90 percent flow exceedances. The USGS flows were used for flow at SC038, SC279 and SC106. At SC744, an additional 4.7 cubic feet per second (as determined from discharge monitoring reports) was added to the USGS segment flow in order to account for the influence of the point source flow at that station.

Annual average TP concentrations from the rotational monitoring stations reflect the impact of nonpoint source runoff, point source discharges and flow conditions in the watershed. The highest annual average TP (0.588 milligrams per liter) in the Whitewater River at SC038 occurred in 2008, a high flow year, demonstrating the impact on water quality of nonpoint source runoff generated by precipitation events. Figure 6 and Table 5 (copied below) of the TMDL document charts and tabulates the average annual TP concentrations at the KDHE sampling stations in the Upper Walnut River Basin from 1990 through 2013. High annual TP average concentrations in the Walnut River at SC279, 0.875 mg/L and in Fourmile Creek at SC744, 0.611 mg/L, occurred during the low flow years of 1991 and 2011, respectively, indicating that effluent from permitted dischargers in the watersheds is reaching and impacting the streams at SC279 and SC744. In the Walnut River at SC106, the highest annual TP concentration (0.442 mg/L) occurred during the low flow year of 1991 and the second highest TP concentration (0.410 mg/L) occurred during the high flow year of 2008 highlighting the influence of both the nonpoint and point source TP contributions from the upper watershed on TP concentrations in the Walnut River at SC106.

	Total Phosphorus (mg/L)							
	SC038		SC279		SC744		SC106	
	Average	Median	Average	Median	Average	Median	Average	Median
1990	0.306	0.210	0.468	0.510	*	*	0.386	0.350
1991	0.195	0.185	0.875	0.795	*	*	0.442	0.450
1992	0.177	0.180	0.512	0.575	*	*	0.293	0.305
1993	0.171	0.180	0.223	0.220	*	*	0.178	0.170
1994	0.159	0.140	0.413	0.415	*	*	0.183	0.180
1995	0.418	0.332	0.365	0.426	*	*	0.362	0.340
1996	0.284	0.220	0.462	0.376	*	*	0.284	0.251
1997	0.308	0.304	0.329	0.325	*	*	0.254	0.221
1998	0.320	0.295	0.225	0.226	*	*	0.263	0.197
1999	0.326	0.175	0.223	0.190	*	*	0.299	0.240
2000	0.192	0.200	0.250	0.280	*	*	0.191	0.170
2001	0.231	0.232	0.282	0.295	*	*	0.203	0.193
2002	0.318	0.249	0.401	0.367	*	*	0.322	0.277
2003	0.290	0.190	0.308	0.282	*	*	0.267	0.248
2004	0.248	0.202	0.220	0.188	*	*	0.235	0.206
2005	0.350	0.197	0.255	0.242	0.284	0.197	0.238	0.203
2006	0.225	0.208	0.464	0.506	*	*	0.288	0.324
2007	0.249	0.232	0.226	0.165	*	*	0.249	0.272
2008	0.588	0.394	0.172	0.146	*	*	0.410	0.245
2009	0.290	0.273	0.093	0.093	0.236	0.216	0.190	0.201
2010	0.429	0.440	0.125	0.099	*	*	0.379	0.291
2011	0.218	0.201	0.138	0.132	0.611	0.465	0.183	0.183
2012	0.218	0.215	0.150	0.179	*	*	0.185	0.184
2013	0.393	0.356	0.192	0.180	*	*	0.236	0.202
1990-2007	*0.265*	*0.197*	*0.361*	*0.330*	*0.284*	*0.197*	*0.274*	*0.274*
2008-2013	*0.341*	*0.257*	*0.145*	*0.119*	*0.423*	*0.361*	*0.264*	*0.268*

*No Data

The KDHE's stream probabilistic monitoring program has collected samples at five sites (listed above) within the Upper Walnut River Basin watershed during 2007, 2011 and 2012. Probabilistic monitoring stations SPB118 and SPB166 are both located on the Whitewater River above SC038 and have the highest TP, ortho-phosphorus and total suspended solids concentrations of the probabilistic stations in the watershed. Bird Creek (SPA100) and the West Branch of the Walnut River (SPB230) are both located above SC279, while Dry Creek (SBP158) is located in the SC106 watershed. Table 9 of the TMDL document presents stream data in the Upper Walnut River Basin collected by the KDHE stream probabilistic monitoring program. Chlorophyll a samples were taken and measured in duplicate during the summer of the sampling years 2007, 2011 and 2012.

The KDHE's stream biological monitoring program has been monitoring the biology at SB106 since 1990. Twenty samples have been collected at SC106 resulting in an average Macroinvertebrate Bioassessment Index value of 4.67 which indicates that the Walnut River at Gordon is partially supporting the biology. The same 20 samples resulted in a 51 percent EPT score which marginally indicates full biological support. Percent EPT is the percent of the macroinvertebrates collected from stream sites that are Ephemeroptera (mayflies), Plecopetera (stoneflies) and Trichoptera (caddisflies), three taxa of aquatic macroinvertebrates that are intolerant of pollution or poor water quality. Generally speaking, the higher the percent EPT, the better the water quality in the stream, with a percent EPT greater than 48 percent considered as fully supporting stream biology. Table 10 of the TMDL document presents the biological data and percent EPT calculations with corresponding median TP concentrations for the KDHE stream sampling sites in the Upper Walnut River Basin.

Dissolved oxygen concentrations in the Walnut River near El Dorado (SC279) have fallen below the Kansas WQS of 5 mg/L in seven samples since 1990. Four of the DO excursions occurred in the spring season, and three occurred during the summer-fall season; totaling seven excursions out of 130 samples collected. There were no dissolved oxygen excursions during the winter season at SC279. Six of the seven DO excursions occurred when the Walnut River was at low flow and the stream temperature was greater than 21 degrees Celcius. One excursion measuring 4.80 mg/L occurred in May 1996 when the stream was at high flow. Figure 20 of the TMDL document shows that, generally, as stream temperature increases, dissolved oxygen concentrations decrease. There have been two DO WQS excursions since the 2007 upgrade to the El Dorado wastewater treatment facility with the first measuring 4.80 mg/L in July 2011 when the stream temperature was 29 degrees C. The second, measuring 4.96 mg/L, occurred in June 2013 when the stream temperature was 24 degrees C.

The TMDL document establishes two milestones or phases with respect to instream TP concentrations to achieve the ultimate goal of the TMDL document to attain Kansas water quality standards by eliminating any of the impacts to aquatic life, contact recreation and domestic water supply associated with excessive phosphorus and objectionable amounts of algae as described in the narrative criteria pertaining to nutrients. The first milestone will be a reduction of the median TP concentration to 0.15 mg/L, based on the median of the average values of sampling stations within Kansas Ecoregions 2 and 5. The second milestone will be a reduction of the TP median to 0.10 mg/L, reaching a concentration equivalent to that of the best 25 percent of the stations within Kansas Ecoregions 2 and 5. Biological endpoints - determined by measuring sestonic chlorophyll *a* concentrations of less than 5 micrograms per liter and Aquatic Life Use Support Index scores greater than or equal to 14 - will provide an indication that phosphorus loads are within the loading capacities of the streams. The Phase I and Phase II endpoints are summarized in the table below.

Station	Phase I TP TMDL endpoints (mg/L)	Phase II TP TMDL endpoints (mg/L)	Biological endpoints and secondary indicators
SC038	0.150	0.10	ALUS Index Score > = 14
SC279*	0.119*	0.10	Chlorophyll *a* < 5 µg/L
SC744	0.150	0.10	DO > 5 mg/L DO Saturation < 110%, > 90%
SC106	0.150	0.10	pH < 8.5

* The current median TP concentration in the Walnut River at SC279 is 0.119 mg/L. Although this concentration is below the established Phase I TP milestone for the other sites in the Upper Walnut River Basin, it will serve as the Phase I milestone for the Walnut River at SC279.

The TMDL document uses the load duration curve method to illustrate loading capacities of the rivers at all flow conditions. The Phase I TP loading capacities in the Whitewater River at Towanda (SC038), the Walnut River near El Dorado (SC279), Fourmile Creek (SC744) and the Upper Walnut River at Gordon (SC106), at their 50 percent flow exceedances for example, are 29.97 pounds per day, 31.15 lb/day, 8.95 lb/day and 20.75 lb/day, respectively. The Phase II TP loading capacities in the Whitewater River at Towanda (SC038), the Walnut River near El Dorado (SC279),

Fourmile Creek (SC744) and in the Upper Walnut River at Gordon (SC106), at their 50 percent flow exceedances for example, are 19.98 lb/day, 26.17 lb/day, 5.97 lb/day and 13.83 lb/day, respectively. Phase I and II total loading capacities at the outlet of the Whitewater/Upper Walnut Rivers watershed at SC106 (825 square miles that include the SC038, SC279, and SC744 watersheds) at the 50 percent flow exceedance for example, are 87.80 lb/day and 58.53, respectively. Total phosphorus Phase I and Phase II concentrations of 0.15 mg/L and 0.10 mg/L, were used to develop the Phase I and II TMDL loading capacities, respectively.

The EPA concurs that meeting the TMDL endpoints will result in attainment of all applicable WQS in the Walnut and Whitewater Rivers.

Designated Use(s), Applicable Water Quality Standard(s) and Numeric Target(s)

The submittal describes applicable water quality standards, including beneficial uses, applicable numeric and/or narrative criteria, and a numeric target. If the TMDL(s) is based on a target other than a numeric water quality criterion, then a numeric expression, site specific if possible, was developed from a narrative criterion and a description of the process used to derive the target is included in the submittal.

Designated uses reflect the KDHE's proposed Kansas Surface Water Register dated December 15, 2010.

Expected Aquatic Life use: Walnut River (3), Walnut River (2, 14) and Whitewater River (17, 18).

Primary Contact Recreation Class B use: Walnut River (3).

Primary Contact Recreation Class C use: Walnut River (2, 14) and Whitewater River (17, 18).

Secondary Contact Recreation b use: Whitewater River (19, 23).

Domestic Water Supply use: Walnut River (3), Walnut River (2, 14), Whitewater River (17, 18) and Whitewater River (19, 23).

Food Procurement use: Walnut River (3), Walnut River (2, 14), Whitewater River (17, 18) and Whitewater River (19, 23).

Groundwater Recharge use: Walnut River (3), Walnut River (2, 14), Whitewater River (17, 18) and Whitewater River (19, 23).

Industrial use: Walnut River (3), Walnut River (2, 14), Whitewater River (17, 18) and Whitewater River (19, 23)

Irrigation use: Walnut River (3), Walnut River (2, 14), Whitewater River (17, 18) and Whitewater River (19, 23).

Livestock Watering use: Walnut River (3), Walnut River (2, 14), Whitewater River (17, 18) and Whitewater River (19, 23).

Designated uses for tributaries in the Walnut Creek watershed are detailed in Table 1 of the TMDL document.

Impaired uses are expected aquatic life, contact recreation and domestic water supply.

The state of Kansas does not have numeric criteria for nutrients, but does have narrative criteria. The TMDL document states the Kansas water quality standards for nutrients as follows:

Nutrients – Narratives: The introduction of plant nutrients into surface waters designated for domestic water supply use shall be controlled to prevent interference with the production of drinking water (K.A.R. 28-16-28e(c)(3)(D)).

The introduction of plant nutrients into streams, lakes, or wetlands from artificial sources shall be controlled to prevent the accelerated succession or replacement of aquatic biota or the projection of undesirable quantities or kinds of aquatic life (K.A.R. 28-16-28e(c)(2)(A)).

The introduction of plant nutrients into surface waters designated for primary or secondary contact recreational use shall be controlled to prevent the development of objectionable concentrations of algae or algal by-products

or nuisance growths of submersed, floating, or emergent aquatic vegetation (K.A.R. 28-26-28e(c)(7)(A)).

The concentration of Dissolved Oxygen in surface waters shall not be lowered by the influence of artificial sources of pollution. Dissolved Oxygen (DO): 5.0 milligram per liter (K.A.R. 28-16e(d), Table 1g).

All designated uses are considered and protected by the TMDL document.

The ultimate goal of the TMDL document is to achieve the Kansas WQS by eliminating the impairment to the designated uses - aquatic life, contact recreation and domestic water supply - associated with excessive phosphorus and objectionable flora as described in the narrative criteria pertaining to nutrients. Addressing excessive phosphorus in the watershed of the Walnut River below El Dorado Lake, monitored at SC279, should also result in dissolved oxygen concentrations meeting the WQS of 5 mg/L. There are no existing numeric phosphorus criteria currently in Kansas. The current EPA suggested benchmarks for stream total phosphorus in the South-Central Cultivated Great Plains Ecoregion is 0.067 mg/L TP over the 10-state aggregate of Level III Ecoregions. A similar TP benchmark for the Central Great Plains, spanning from Nebraska to Texas, was 0.090 mg/L.

The Upper Walnut River watershed which includes monitoring stations SC038, SC106, SC279 and SC744 is partly within Ecoregion 27d, the Wellington-McPherson Lowlands and partly within Ecoregion 28, the Flint Hills. Station SC038 and SC106 are located on the dividing line between Level III Ecoregions 27 and 28. Ecoregions specific to Kansas and delineated in the Kansas Reference Streams Report were used to develop TP endpoints for the stations covered by the TMDL document. Station SC038 is located in Kansas Ecoregion 2 and SC279, SC744 and SC106 are located in Kansas Ecoregion 5, hence, median and lower quartile TP values (1990 through 2013 rotational stations, 2000 through 2013 permanent stations) for the 181 stations in Kansas Ecoregions 2 and 5 were determined. The median of the 181 stations' median TP concentrations and median of the 181 stations' 25th percentile TP concentrations were then calculated at 0.147 mg/L and 0.097 mg/L, respectively, and rounded to give Phase I and Phase II TP endpoints of 0.15 and 0.10 mg/L TP. Appendix C of the TMDL document contains data used in the development of Phase I and Phase II TP endpoints using the Kansas Ecoregions.

The rounded median (0.15 mg/L) and rounded 25th percentile (0.10 mg/L) TP concentrations for the combined Kansas Ecoregions 2 and 5 will serve as the Phase I TP and Phase II TP endpoints, respectively. As the current median TP concentration of 0.119 mg/L measured at SC279 is below the Kansas Ecoregion Phase I concentration, a total phosphorus concentration of 0.119 mg/L will be the Phase I TP endpoint with a Phase II TP endpoint of 0.10 mg/L.

A complication cited by the KDHE in setting an endpoint is establishing the linkage of phosphorus levels to applicable biological response variables. Figure 28 of the TMDL document shows a noisy relationship with phosphorus that defies establishing a solitary threshold value and support an adaptive management approach to reduce current phosphorus loads and concentrations and to observe corresponding improvement in biological metrics and sestonic chlorophyll *a* prior to implementing further reductions. Therefore, the primary measure of nutrient loading to the streams in the Upper Walnut River watershed will be the Aquatic Life Use Support Index. The ALUS Index will serve to establish whether or not the biological community at the SC stations in the Upper Walnut River watershed reflects recovery, renewed diversity and minimal disruption by the impacts described in the narrative criteria for nutrients on aquatic life, contact recreation and domestic water supply. The ALUS Index as described in the 2014 303(d) Listing Methodology consists of five categorizations of biotic condition that, once measured, are assigned a score. Scores are then tallied and a support category is assigned. The five categorizations of biotic conditions make up the ALUS Index score:

1. Macroinvertebrate Biotic Index: A statistical measure that evaluates the effects of nutrients and oxygen demanding substances on macroinvertebrates based on the relative abundance of certain indicator taxa (orders and families).
2. Ephermeroptera, Plecoptera and Trichoptera abundance as a percentage of the total abundance of macroinvertebrates.
3. Kansas Biotic Index for Nutrients: Mathematically equivalent to the MBI, however, the tolerance values are species specific and restricted to aquatic insect orders.
4. EPT Percent of Count: The percentage of organisms in a sample consisting of individuals belonging to the EPT orders.
5. Shannon's Evenness: A measure of diversity that describes how evenly distributed the numbers of individuals are among the taxa in a sample.

ALUS Index metrics with scoring ranges:

MBI	KBI-N	EPT	EPT Percent CNT	SHN EVN	Score
<= 4.18	<= 2.52	>= 16	>= 65	>= 0.849	4
4.19-4.38	2.53-2.64	14-15	56-64	0.826-0.848	3
4.39-4.57	2.65-2.75	12-13	48-55	0.802-0.825	2
4.58-4.88	2.76-2.87	10-11	38-47	0.767-0.801	1
>= 4.89	>= 2.88	< = 9	<= 37	<= 0.766	0

ALUS Index score range, interpretation of biotic condition, and supporting, partial, and non-supporting categories:

ALUS Index Score	Biotic Condition	Support Category
17-20	Very Good	Supporting
14-16	Good	
7-13	Fair	Partially Supporting
4-6	Poor	
1-3	Very Poor	Non-supporting

Additionally, the concentration of phytoplankton floating in the water column as measured at SC106, as determined by measuring the sestonic chlorophyll *a* concentrations in the Walnut River at Gordon, will serve to establish whether or not the biological community within all stream segments within the Upper Walnut River watershed reflects recovery, renewed diversity and minimal disruption by the impacts described in the narrative criteria for nutrients on aquatic life, recreation and domestic water supply.

Secondary indicators of the health of the instream biological community include:
1. Percent dissolved oxygen saturation is the measure of oxygen in the water relative to the water's potential dissolved oxygen concentration. Dissolved oxygen concentrations below 5.0 mg/L put aquatic life under stress while dissolved oxygen percent saturation levels greater than 110 percent are indicative of over-active primary productivity.
2. Excessive nutrients can contribute high levels of biological activity and vigorous photosynthesis which is known to cause pH to rise above 8.5, another indicator of excess primary production.

Therefore, the numeric endpoints for the TMDL document, indicating attainment of WQS within the watershed are:

1. An ALUS Index score greater than or equal to 14.
2. Sestonic chlorophyll *a* concentration below 5 micrograms per liter.
3. Dissolved oxygen concentrations greater than 5.0 mg/L; dissolved oxygen saturation below 110 percent and above 90 percent.
4. pH below 8.5 (and within the range of pH criteria, 6.5 - 8.5, described in Kansas WQS).

All four endpoints have to be maintained over three consecutive years at SC106 to constitute full support of the designated uses of the Whitewater River at Towanda (SC038), the Walnut River near El Dorado (SC279), Fourmile Creek near Gordon (SC744) and the Walnut River at Gordon (SC106). After the endpoints are attained at SC106, simultaneous digression from these endpoints more than once every three years, on average, at SC106 constitutes a resumption of impaired conditions at SC038, SC279, SC744 and SC106.

Pollutant(s) of Concern

A statement that the relationship is either directly related to a numeric water quality standard, or established using surrogates and translations to a narrative WQS is included. An explanation and analytical basis for expressing the

TMDL(s) through surrogate measures, or by translating a narrative water quality standard to a numeric target is provided (e.g., parameters such as percent fines and turbidity for sediment impairments, or chlorophyll-a and phosphorus loadings for excess algae). For each identified pollutant, the submittal describes analytical basis for conclusions, allocations and a margin of safety that do not exceed the loading capacity. If the submittal is a revised TMDL document, there are refined relationships linking the load to water quality standard attainment. If there is an increase in the TMDL(s), there is a refined relationship specified to validate that increase (either load allocation or wasteload allocation). This section will compare and validate the change in targeted load between the versions.

The state of Kansas does not have numeric criterion for total phosphorus, but instead uses narrative criteria for nutrients. A link has been established between the numeric total phosphorus target in the TMDL document and narrative criteria for nutrients in Kansas water quality standards. The current EPA suggested benchmarks for stream TP in the South-Central Cultivated Great Plains Ecoregion is 0.067 milligrams per liter TP over the 10-state aggregate of Level III Ecoregions. The TMDL document is established in phases and stages to reduce phosphorus loadings and ambient TP concentrations with periodic assessment of the sestonic chlorophyll *a* concentration and biological endpoints in the Walnut River at SC106. Phase I will entail reductions in phosphorus levels in the discharge from the city of Wichita – Fourmile wastewater treatment facility, city of Andover WWTF and city of Augusta WWTF. During Phase I, discharging facilities should also investigate and implement alternative discharge methods. Additionally, riparian and livestock management in the watershed should reduce nonpoint source loads. These reductions to the Phase I target should translate to median concentrations approaching the TP median concentration for the Kansas Ecoregions 2 and 5.

The narrative criteria of the Kansas water quality standards are based on conditions of the prevailing biological community. Once the TP concentrations approach the Phase I target of 0.15 mg/L, an intensive assessment of the macroinvertebrate community and the water column chlorophyll *a* will be made at SB106 to determine attainment of the narrative nutrient criteria. The sestonic chlorophyll concentrations and the Aquatic Life Use Support Index will serve to establish whether or not the biological community of the lower Cottonwood and Neosho River reflects recovery, renewed diversity and minimal disruption by the impacts described in the narrative criteria for nutrients on aquatic life, recreation and domestic water supply.

Excessive primary productivity may also be indicated by extreme swings in dissolved oxygen or pH as the chemical reaction of photosynthesis and respiration alter the ambient levels of oxygen or acid-base balance of the stream. Dissolved oxygen is inversely related to the ambient temperature in the stream at SC038, SC279, SC744 and SC106 as displayed in the TMDL document, Figures 21, 22, 23 and 24, respectively. As TP concentrations are reduced, the dissolved oxygen levels in the Walnut River below El Dorado Lake, monitored at SC279, is expected to improve, thereby meeting the WQS and restoring full support of the designated uses of the Walnut River below El Dorado Lake. The TMDL document effectively links the success of the TP TMDLs to improvement in the DO concentrations in the Walnut River below El Dorado.

Presuming one or more endpoints are not met at the end of Phase I, Phase II will commence. Additional reductions in loads and phosphorus concentrations will be accomplished through enhanced implementation of controls on point and nonpoint sources. The desired instream Phase II target levels are equivalent to the median concentration of the lower quartile TP values for Kansas Ecoregions 2 and 5. The city of Wichita – Fourmile WWTF, city of Andover WWTF and city of Augusta WWTF will likely need to install enhanced nutrient removal technology and implement the storm water abatement practices detailed in the Municipal Separate Storm Sewer System permits. Phase II nonpoint source abatement will include targeting tributaries located adjacent to cropland for riparian management throughout the Upper Walnut River watershed. A second intensive assessment of the sestonic chlorophyll *a* concentration and biological endpoints will be made once median phosphorus concentrations approach the Kansas Ecoregion benchmark of 0.10 mg/L.

The TMDL document effectively links the success of the TP TMDLs to improvement in the biological conditions in the Neosho and lower Cottonwood Rivers, thereby meeting the WQS and restoring full support of the designated uses of the rivers.

Source Analysis

Important assumptions made in developing the TMDL document, such as assumed distribution of land use in the watershed, population characteristics, wildlife resources and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources, are described. Point, nonpoint and background sources of pollutants of concern are described, including magnitude and location of the sources. The submittal demonstrates all significant sources have been considered. If this is a revised TMDL document any new sources or removed sources will be specified and explained.

In the absence of a national pollutant discharge elimination system permit, the discharges associated with sources were applied to the load allocation, as opposed to the wasteload allocation for purposes of this TMDL document. The decision to allocate these sources to the LA does not reflect any determination by the EPA as to whether these discharges are, in fact, unpermitted point source discharges within this watershed. In addition, by establishing these TMDL(s) with some sources treated as LAs, the EPA is not determining that these discharges are exempt from NPDES permitting requirements. If sources of the allocated pollutant in this TMDL document are found to be, or become, NPDES-regulated discharges, their loads must be considered as part of the calculated sum of the WLAs in this TMDL document. Any WLA in addition to that allocated here is not available.

Point Sources: There are a total of thirty-eight National Pollutant Discharge Elimination System permitted facilities and six Municipal Separate Storm Sewer System permitted entities in the Upper Walnut River watershed. Of the thirty-eight permitted facilities, eleven are located in the Whitewater River at Towanda (SC038) watershed, seven are located in the Walnut River near El Dorado (SC279) watershed, seven are located in the Fourmile Creek near Gordon watershed (SC744) and thirteen are located in the Walnut River at Gordon (SC106) watershed. Of the thirty-eight NPDES permitted facilities, thirteen are prohibited from discharging and are assigned a total phosphorus wasteload allocation of zero. The NPDES permitted facilities that are discharging into the watershed are listed in Table 17 of the TMDL document, and a complete list of NPDES permitted facilities in the watershed is in Appendix A of the TMDL document.

In the watershed above SC038, seven of the eleven facilities are permitted to discharge to the watershed. Four of the facilities are municipal lagoon systems that are required to monitor for TP quarterly when discharging. As discharging lagoons, these facilities are considered contributors to the TP load at SC038; hence, they are assigned a wasteload allocation for TP. There are also two groundwater remediation facilities in the watershed: Lubrication Engineers and El Paso Merchant – Benton. However, only the permit belonging to Lubrication Engineers requires TP monitoring (annually) and compliance samples reported for 2011 and 2012 were below the laboratory analytical reporting limit of 0.1 milligrams TP per liter. The Drisco, LLC permit does not require TP monitoring because it is for a coke storage facility with a holding pond that rarely discharges and any phosphorus load is expected to be minimal. Because the Lubrication Engineers, El Paso Merchant – Benton and Drisco, LLC facilities are not expected to contribute to the TP load at SC038, a wasteload of zero TP was assigned to their permits.

Of the seven permitted facilities in the SC279 watershed, six are permitted to discharge including Frontier El Dorado Refining LLC, a major industrial discharger, and the city of El Dorado wastewater treatment facility, a major municipal discharger. The city of El Dorado's facility is a mechanical plant equipped with biological nutrient removal technology and ultra violet light disinfection that came online mid-2007 and discharges an average of 2.1 million gallons per day at an average TP concentration of 0.42 mg/L (2008 through 2013). The city of El Dorado reports flow daily and monitors monthly for TP. The Frontier wastewater treatment facility is described as an American Petroleum Institute oil separator with a dissolved air flotation unit and discharges an average of 1.9 MGD (2008 through 2013). Frontier Refining reports flow daily but is not required to monitor for TP. A compliance sample collected by the KDHE in 2012 at the Frontier outfall had a TP value of 0.77 mg/L, however. Both facilities are considered contributors to the phosphorus load at SC279 and have been assigned a TP wasteload allocation. The mobile home park, El Dorado Mobile Estates, is permitted to discharge from its two-cell lagoon, is required to monitor monthly for TP, and has been assigned a wasteload allocation. Three additional permittees are discharging to the watershed but are not expected to contribute a phosphorus load: El Paso Merchant Energy, Enbridge Pipeline and CMC-El Dorado have been assigned a wasteload allocation of zero TP by the TMDL document.

In the SC744 watershed, five of the seven facilities are permitted to discharge to the watershed. The city of Andover and the city of Wichita – Fourmile WWTFs are major municipal dischargers. Both permits require flow to be reported daily and TP to be monitored monthly. The Wichita – Fourmile Plant is equipped with an anaerobic/anoxic/aerobic process that discharges an average of 2.27 MGD with an average TP concentration of 0.94mg/L (2008-2013). The city of Andover is equipped with an activated sludge-extended aeration process with ultra-violet light disinfection and discharges an average of 0.79 MGD at an average TP concentration of 2.37 mg/L. The city of Andover plant is also equipped to divert effluent for use in irrigating its golf course. From January 1, 2008, through December 31, 2013, the city of Andover irrigated with an average of 0.70 MGD effluent on 534 days. Both the Wichita – Fourmile Plant and the city of Andover WWTF are contributing to the phosphorus load at SC744 and have been assigned wasteload allocations. The Sherwin-Williams facility and both CMC Ready Mix Concrete Mix plants are also permitted to discharge to the watershed. They are not required to monitor for phosphorus, and are not expected to contribute to the phosphorus load at SC744. A wasteload allocation of zero has been established for these three facilities.

Seven of the thirteen NPDES permitted facilities in the SC106 watershed are permitted to discharge. The city of Augusta is a major municipal discharger operating a wastewater treatment facility equipped with BNR and UV technologies that discharges an average of 1.11 MGD with an average TP concentration of 0.33 mg/L (2008 through 2013). The city of Augusta WWTF permit requires flow monitoring daily and monthly monitoring for TP and has been assigned a wasteload allocation. The city of Towanda and the Kansas Turnpike Authority – Towanda Service Area are both operating discharging three cell lagoons; both facilities are required to monitor quarterly for TP, when discharging. Although both facilities only discharged once during the 2008 through 2013 time period, the city of Towanda and the KTA – Towanda permits have been assigned a wasteload allocation. The other four discharging permits in the SC106 watershed are Williams Petroleum Services, an inactive refinery only handling storm water runoff, Martin Marietta, a limestone crushing operation and two Rock Quarries: Southwest Butler and Bob Bergkamp Construction. These four facilities are not expected to contribute to the TP load at SC106. A wasteload allocation of zero has been established for these facilities.

There are six MS4 permits in the Upper Walnut River Basin as listed in Table 18 of the TMDL document (copied below). Using the 2010 US Census' GIS populated area coverage it was determined that about 0.5 percent, 0.3 percent and 0.3 percent of the SC038 watershed falls within the jurisdiction of Sedgwick County, Wichita and Bel Aire, respectively. About 7 percent of the SC279 watershed lies within the populated area of El Dorado. In the SC106 watershed, the populated areas of Sedgwick County, Wichita, Bel Aire and El Dorado comprise about 0.5 percent, 0.7 percent, 0.5 percent and 0.05 percent of the watershed, respectively. The SC744 watershed is the most impacted by storm water runoff with 11 percent, 22 percent and 14 percent of the watershed lying within the jurisdiction of Sedgwick County, Wichita and Andover.

MS4 Permits in the Upper Walnut River watershed

Permittee	NPDES Permit #	KS Permit #	Permit Expires
Sedgwick County	KSR041032	M-AR94-SU01	1/31/19
city of Wichita	KS0091049	M-AR94-S001	1/31/19
Kansas Department of Transportation – Wichita	KSR041011	M-AR94-SU02	1/31/19
city of Belle Aire	KSR041002	M-LA23-SU01	1/31/19
city of Andover	KSR041001	M-WA01-SU01	1/13/19
city of El Dorado	KSR044004	M-WA09-SN01	1/31/19

Land Use: Land use within the Upper Walnut River Basin is mostly grass and pasture land (54 percent) and cultivated crops (32 percent) as shown in Figure 29 of the TMDL document. The SC038 watershed has the highest percentage of cultivated cropland (48 percent) and the lowest percentage of developed land (4 percent) of the four SC site watersheds (Table 19 of the TMDL document lists the land use areas and percentages in the Upper Walnut River watershed). The SC279 watershed is impacted by both agriculture and urban development being comprised of 77 percent grass and pasture land, and 9 percent developed land. The same mix of urban/agricultural influence can be seen at SC744 with 58 percent of the watershed comprised of grass and pasture land while 21 percent of the watershed is considered developed. The SC106 watershed sees influence from cropland (21 percent) but is primarily grass and pasture land (61 percent) with some influence from developed land (8 percent).

Livestock Waste Management Systems: There are one hundred and two registered, certified, permitted or applications for animal feeding operations within the Upper Walnut River watershed (listed in Appendix B of the TMDL document). Of the one hundred and two, ninety-two are located in the SC038 watershed, eight are located in the SC106 watershed, and the SC744 and SC279 watersheds each contain one concentrated animal feeding operation. Additionally, eight of the ninety-two CAFOs in the SC038 watershed hold federal NPDES permits and there are two applications pending (A-WABU-C016 and A-WABU-C017) that are likely to be issued federal

NPDES permits. These registered, certified or permitted facilities are designed to retain a 25-year, 24-hour rainfall/runoff event as well as an anticipated two weeks of normal wastewater from their operations. Typically, this rainfall event coincides with streamflow that is less than 1-5 percent flow exceedance. All CAFOs in the watersheds are assigned a TP wasteload allocation of zero.

NPDES-Permitted CAFOs in the watershed, SC038

Permit #	County	Animal Total	Type	Animal Type(s)
A-WABU-H002	Butler	11,400	Permit	Swine
A-WABU-C007	Butler	9,999	Renewal	Beef
A-WABU-C002	Butler	20,000	Renewal	Beef
A-WABU-C012	Butler	4,085	Permit	Beef, Swine
A-WABU-H001	Butler	6,532	Permit	Swine, Beef
A-WABU-C009	Butler	3,500	Permit	Beef
A-WABU-C017	Butler	1,500	Application	Beef
A-WABU-C016	Butler	1,600	Application	Beef
A-WABU-C015	Butler	1,600	Renewal	Beef
A-WABU-C011	Butler	1,800	Renewal	Beef

According to the U.S. Department of Agriculture National Agricultural Statistics Service, on January 1, 2013, there were a total of 232,000 head of cattle, including calves, in the counties with land area in the Upper Walnut River watershed (tabulated below). The USDA NASS also reported a total of 66,600 head of hogs in those same counties as of December 1, 2012. The animal waste from both confined and unconfined feeding sites is considered a potentially significant source of TP loading to the streams in the Upper Walnut River watershed.

County inventory of cattle, including calves, on January 1, 2013 and of hogs on December 1, 2012, according to the USDA NASS:

County	Cattle, including Calves	Hogs
Marion	70,000	16,100
Harvey	34,000	10,300
Sedgwick	28,000	2,200
Butler	100,000	38,000
Total	232,000	66,600

Any CAFO that does not obtain an NPDES permit must operate as a no discharge facility. Any discharge from an unpermitted CAFO is a violation of Section 301. It is the EPA's position that all CAFOs should obtain an NPDES permit because it provides clarity of compliance requirements, authorization to discharge when the discharges are the result of large precipitation events (e.g., in excess of 25-year and 24-hour frequency/duration) or are from a man-made conveyance.

Permitted CAFOs identified in this TMDL document are part of the assigned wasteload allocation. The AFOs and unpermitted CAFOs are considered under the load allocation because we do not have enough detailed information to know whether these facilities are required to obtain NPDES permits. This TMDL document does not reflect a determination by the EPA that such facility does not meet the definition of a CAFO nor that the facility does not need to obtain a permit. To the contrary, a CAFO that discharges or proposes to discharge has a duty to obtain a permit. If it is determined that any such operation is a CAFO that discharges, any future wasteload allocation assigned to the facility must not result in an exceedance of the sum of the WLAs in this TMDL document as approved.

On-Site Waste Systems: According to the Spreadsheet Tool for Estimating Pollutant Loads, there are 1,984 septic systems in the SC038 watershed; 488 septic systems in the SC279 watershed; 582 septic systems in the SC744 watershed; and 923 septic systems in the SC106 watershed. Additionally, according to STEPL, approximately 0.93 percent of the systems are failing. Because of their small flows and loads, failing on-site septic systems would be a minor source of nutrient loadings within the watershed and would not significantly contribute to the phosphorus impairment in the watersheds.

Population Density: According to the 2010 census data from the U.S. Census Bureau, the population of the Upper Walnut River watershed is approximately 81,303 people giving a population density of 99 people/square mile. This is an increase of about 25 percent over the 2000 census results with population growth expected to continue in the watershed.

U.S. Census results and a 2030 population projection from the Kansas Water Office for cities in the Upper Walnut River watershed

City	2000 U.S. Census	2010 U.S. Census	2030 Population Projection
Potwin	457	449	516
Elbing	218	229	318
Whitewater	653	718	860
Benton	827	880	1,213
Towanda	1,338	1,450	2,015
Augusta	8,423	9,274	12,201
El Dorado	12,057	13,021	16,857
Bel Aire	5,836	6,769	10,.373
Wichita	344,284	382,368	410,609
Andover	6,698	11,791	11,876

Contributing Runoff: The watersheds of SC038, SC279, SC744 and SC106 have mean soil permeability of 0.28, 0.45, 0.24 and 0.36 inches per hour, respectively. Figure 30 of the TMDL document maps soil permeability throughout the Upper Walnut River watershed. Permeability in the SC038 watershed ranges from 0.01 to 2.65 inches/hour with over 40 percent of the watershed having extremely low permeability values of 0.57 inches/hour or lower. The range of permeability values in the watersheds contributing to SC279, SC744 and SC106 is 0.01 to 1.29 inches/hour with over 50 percent of each watershed having a very low soil permeability of 0.75 inches/hour or less. According to a U.S. Geological Survey report, the threshold soil permeability values are set at 3.43 inches/hour for very high, 2.86 inches/hour for high, 2.29 inches/hour for moderate, 1.71 inches/hour for low, 1.14 inches/hour for very low and 0.57 inches/hour for extremely low soil-permeability. As a result of low soil

permeability, higher overland runoff occurs from the watershed during rainfall events, potentially picking-up and delivering sediment and nutrients to the Walnut River.

Background and Natural Sources: Phosphorus is present over the landscape, in the soil profile as well as terrestrial and aquatic biota. Wildlife can contribute phosphorus loadings, particularly if they congregate to a density that exceeds the assimilative capacity of the land or water.

All known sources have been considered.

Allocation - Loading Capacity

The submittal identifies appropriate loading capacities, wasteload allocations for point sources and load allocations for nonpoint sources. If no point sources are present, the WLA is stated as zero. If no nonpoint sources are present, the LA is stated as zero [40 CFR § 130.2(i)]. If this is a revised TMDL document the change in loading capacity will be documented in this section. All TMDLs must give a daily number. Establishing TMDL "daily" loads consistent with the U.S. Court of Appeals for the D.C. circuit decision in Friends of the Earth, Inc. v. EPA, et al., No. 05-5015, (April 25, 2006).

The loading capacity is calculated as: LC = sum of wasteload allocation + sum of load allocation + margin of safety. Daily loads are computed by multiplying the Phase I and Phase II target total phosphorus concentrations, 0.15 milligrams per liter and 0.10 mg/L, respectively, by flow exceedances along the flow duration curves and a unit conversion factor.

The established TMDLs are detailed in Figure 31 of the TMDL document for the Whitewater River at Towanda (SC038), in Figure 32 for the Walnut River near El Dorado (SC279), in Figure 33 for Fourmile Creek near Gordon (SC744) and in Figure 34 for the Walnut River at Gordon (SC106). Figure 35 displays the TMDL for the combined Whitewater/Lower Walnut River watersheds at SC106 including the reserve wasteload allocation.

Tables 25, 26, 27 and 28 of the TMDL document lists Phase I and II load capacities and allocations at 10, 25, 50 and 75 percent flow exeedances in the Whitewater River at Towanda (SC038), the Walnut River near El Dorado (SC279), Fourmile Creek near Gordon (SC744) and the Upper Walnut River at Gordon (SC106). Current loading conditions are also listed based on the 2008 through 2013 average TP concentrations at each station. For example, at the 50 percent flow exceedance the current load is 71.1 pounds per day and the Phase I loading capacity in the Whitewater River (SC038) is 29.97 lb/day. Tables 26 and 27 for the Walnut River near El Dorado and Fourmile Creek near Gordon include the reserve Municipal Separate Storm Sewer System wasteload allocations established to anticipate future growth of the urban areas in the watershed. Table 29 of the TMDL document lists Phase I and II loading capacities, wasteload allocations and load allocations in the Walnut River at Gordon (SC106) for the Whitewater and Upper Walnut watersheds (825 square miles which includes the SC038, SC279 and SC744 watersheds). Table 29 also includes the reserve wasteload allocation established to anticipate future National Pollutant Discharge Elimination System-permitted dischargers in the Whitewater and Upper Walnut River watershed.

Wasteload Allocation Comment

The submittal lists individual wasteload allocations for each identified point source [40 CFR § 130.2(h)]. If a WLA is not assigned it must be shown that the discharge does not cause or contribute to a water quality standard excursion, the source is contained in a general permit addressed by the TMDL, or extenuating circumstances exist which prevent assignment of individual WLA. Any such exceptions must be explained to a satisfactory degree. If a WLA of zero is assigned to any facility it must be stated as such [40 CFR § 130.2(i)]. If this is a revised TMDL document, any differences between the original TMDL(s) WLA and the revised WLA will be documented in this section.

Point Sources: The Phase I wasteload allocations associated with the total phosphorus contributing facilities in the watershed are detailed in Table 24 of the TMDL document. The Phase I and Phase II wasteload allocations at SC038 are equivalent because all four dischargers are intermittently discharging municipal lagoons with wasteload allocations calculated based on their design flows and a TP discharge concentration of 2.0 milligrams per liter, an effluent TP concentration commonly seen from Kansas lagoon systems.

At SC279, the Phase I wasteload allocation for Frontier Refining was based on a design capacity of 2.54 million gallons per day and a TP concentration of 1.0 mg/L while during Phase II the TP concentration was reduced to 0.5 mg/L. The city of El Dorado Phase I wasteload allocation was based on a design capacity of 3 MGD with a TP concentration of 1 mg/L. The Phase II wasteload allocation for the city of El Dorado was determined by keeping the design capacity at 3 MGD and dropping the TP concentration to 0.5 mg/L. The El Dorado Mobile

Estates' Phase I and II wasteload allocations were calculated using design flow and 2 mg/L TP, an effluent TP concentration commonly seen from Kansas lagoon systems.

At SC744, the city of Andover may need to implement biological nutrient reduction improvements in order to meet the Phase I wasteload that was calculated at 1.5 mg/L with a design flow of 1.2 MGD. During Phase II, Andover may need to continue to improve by introducing enhanced nutrient reduction technologies in order to meet the wasteload allocation calculated at a TP concentration of 0.5 mg/L and a design flow of 1.2 MGD. The city of Wichita - Fourmile wastewater treatment facility is scheduled to expand to a design flow of 6 MGD, therefore, the Phase I wasteload allocation for the Fourmile plant was calculated with a TP concentration of 0.75 mg/L and a design flow of 6 MGD. The Wichita - Fourmile plant may need to implement enhanced nutrient removal in order to meet the Phase II wasteload allocation calculated at 0.5 mg/L TP with a design flow of 6 MGD.

At SC106, the KTA and city of Towanda Lagoon systems were assigned Phase I and II wasteload allocations based on design flow (Table 24 of the TMDL document) and a TP concentration of 2.0 mg/L, an effluent TP concentration commonly seen from Kansas lagoon systems. The city of Augusta's Phase I WLA was based on a TP concentration of 1.0 mg/L and a design flow of 1.5 MGD. During Phase II, Augusta may need to implement enhanced nutrient removal in order to reach a discharge TP concentration of 0.5 mg/L.

In addition, a wasteload allocation of 4,573.45 pounds per year TP has been reserved at SC106 in anticipation of further growth and development in the Whitewater/Upper Walnut River watershed. This reserve may be portioned and applied to new or expanded National Pollutant Discharge Elimination System permitted facilities discharging to the SC038, SC279, SC744 or SC106 watersheds. Table 24 of the TMDL document includes the Phase I wasteload allocations for discharging facilities in the Upper Walnut River watershed, and the total municipal, industrial and reserve WLA for the Upper Walnut River Watershed is 135.71 pounds per day.

A wasteload allocation of zero has been assigned to each of the following National Pollutant Discharge Elimination System-permitted facilities: Lubrication Engineers, El Paso Merchant – Benton and Drisco, LLC, El Paso Merchant Energy, Enbridge Pipeline, CMC-El Dorado, Sherwin-Williams, two CMC Ready Mix Concrete plants, Williams Petroleum Services, Martin Marietta, Southwest Butler and Bob Bergkamp Construction. All CAFOs in the watersheds are assigned a TP wasteload allocation of zero.

Municipal Separate Storm Sewer Systems: The Wasteload Allocation for the MS4 storm water is provided by proportioning the remaining loading capacity, after accounting for the NPDES WLA and reserve WLA, between MS4 and nonpoint source loads. This was done by assuming load contributions would arise from the incorporated land area belonging to the municipalities holding an MS4 permit in the watersheds. Thus, the MS4 WLA at SC038 is based on the incorporated land area in the SC038 watershed under the jurisdiction of Wichita and Bel Aire equal to 0.62 percent of the watershed (Figure 31 of the TMDL document). The MS4 WLA at SC279 is based on the incorporated land area in the SC279 watershed under the jurisdiction of the city of El Dorado equal to 6.7 percent of the watershed (Figure 32 of the TMDL document). A reserve MS4 WLA at SC279 was developed to account for future growth of developed areas equal to an additional 3.3 percent of the watershed. The MS4 WLA at SC744 is based on the incorporated land area in the SC744 watershed under the jurisdiction of Wichita and Andover equal to 36 percent of the watershed (Figure 33 of the TMDL document). A reserve MS4 WLA at SC744 was developed to account for future growth of developed areas equal to an additional 14 percent of the watershed. The MS4 WLA at SC106 is based on incorporated land area in the SC106 watershed under the jurisdiction of Wichita, Bel Aire and El Dorado equal to 1.3 percent of the watershed.

Load Allocation Comment

All nonpoint source loads, natural background and potential for future growth are included. If no nonpoint sources are identified, the load allocation must be given as zero [40 CFR § 130.2(g)]. If this is a revised TMDL document, any differences between the original TMDL(s) LA and the revised LA will be documented in this section.

The load allocation for nonpoint sources is the remaining loading capacity after assimilated wasteloads for National Pollutant Discharge Elimination System wastewater and Municipal Separate Storm Sewer Systems have been accounted for. Load allocations at various flow exceedances are contained in Tables 25, 26, 27, 28 and 29 of the TMDL document. Nonpoint sources are assumed to be nil at SC279 and SC744 during low flow conditions when the Walnut River and Fourmile Creek flow is composed strictly of effluent from the mechanical wastewater treatment plants discharging above those stations. The load allocation grows proportionately as normal conditions occur and the load allocation continues to increase with wet weather conditions, thereby accounting for increased runoff from contributing areas. Phase I and II total load allocations at the outlet of the Whitewater/Upper Walnut Rivers watershed at SC106 (825 square miles that include the SC038, SC279, and SC744 watersheds) at the 25

percent flow exceedance for example (from Table 29 of the TMDL document), are 192.11 pounds per day and 138.98 lb/day, respectively. Total phosphorus Phase I and Phase II concentrations of 0.15 mg/L and 0.10 mg/L, were used to develop the Phase I and II TMDL loading capacities, respectively.

Margin of Safety

The submittal describes explicit and/or implicit margins of safety for each pollutant [40 CFR § 130.7(c)(1)]. If the MOS is implicit, the conservative assumptions in the analysis for the MOS are described. If the MOS is explicit, the loadings set aside for the MOS are identified and a rationale for selecting the value for the MOS is provided. If this is a revised TMDL document, any differences in the MOS will be documented in this section.

The margin of safety provides some hedge against the uncertainty in phosphorus loading into the Whitewater River, Walnut River and Fourmile Creek, that stems predominantly from the point source dischargers in the watershed. This TMDL uses an implicit margin of safety, relying on conservative assumptions to be assured that future wasteload allocations will not cause further excursion from the nutrient criteria. Firstly, flows generated using downstream gages are likely overestimated. Additionally, the sestonic chlorophyll *a* and biological endpoints used to assess compliance with the narrative criteria have to be maintained for three consecutive years before attainment of water quality standards can be claimed. Finally, because there is often a synergistic effect of phosphorus and nitrogen on instream biological activity, concurrent efforts by Wichita Fourmile, Andover and Augusta to reduce nitrogen content of its wastewater should complement the effect of phosphorus load reduction in improving the biological condition of the streams in the Upper Walnut River Basin.

Seasonal Variation and Critical Conditions

The submittal describes the method for accounting for seasonal variation and critical conditions in the TMDL(s) [40 CFR § 130.7(c)(1)]. Critical conditions are factors such as flow or temperature which may lead to the excursion of the WQS. If this is a revised TMDL document, any differences in conditions will be documented in this section.

The month with the highest average total phosphorus concentration at SC038, SC106 and at SC279 following the upgrade at the El Dorado wastewater treatment facility was June, which coincides with the spring season's precipitation runoff events (Figure 8 of the TMDL document). October was the month with the highest average TP concentration at SC744 as well as at SC279 prior to the El Dorado wastewater treatment facility upgrade highlighting the influence of point sources on streams during periods of relative low flow. The lowest average monthly concentration at SC744, for the period of record, and at SC279, prior to WWTF upgrades, occurred in May during a period of relatively high flow indicting the point source discharges are diluted by precipitation events (Table 6 of the TMDL document). Figure 9 of the TMDL document supports this with the lowest TP concentrations occurring during the winter season at stations minimally impacted by point sources (SC038, SC106 and SC279 after 2007). At SC279 (before 2008) and SC744 TP concentrations are higher during the winter and summer-fall seasons, respectively, again indicating the influence of point source discharge during periods of low to moderate flow.

The TMDL document's load duration curve method represents flow under all conditions. Because the wasteload allocation, load allocations and TMDLs are applicable at all flow conditions, they are also applicable and protective over all seasons. The advantage of the load duration curve method is that all flow conditions are considered and the constraints associated with using a single-flow critical condition are avoided. Seasonal variation is accounted for in the TMDL document since the endpoints account for all flow conditions throughout the year.

Public Participation

The submittal describes required public notice and public comment opportunities, and explains how the public comments were considered in the final TMDL(s) [40 CFR § 130.7(c)(1)(ii)].

Public Notice: An active Internet website is established at http://www.kdheks.gov/tmdl/index.htm to convey information to the public on the general establishment of TMDLs and specific TMDLs for the Walnut Basin.

Public Hearing: A Public Hearing on the Walnut River Basin TMDLs was held in Emporia, Kansas on August 28, 2014, to receive comments on the TMDL document. Comments on the TMDL document were received from the city of Wichita and the city of Andover. The KDHE addressed all comments appropriately.

Basin Advisory Committee: The Walnut River Basin Advisory Committee met to discuss the TMDLs in the basin on August 28, 2014, in Augusta, Kansas.

Monitoring Plan for TMDL(s) Under a Phased Approach

The TMDL identifies a monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of water quality standards, and a schedule for considering revisions to the TMDL(s) (where a phased approach is used) [40 CFR § 130.7]. If this is a revised TMDL document, monitoring to support the revision will be documented in this section. Although the EPA does not approve the monitoring plan submitted by the state, the EPA acknowledges the state's efforts. The EPA understands that the state may use the monitoring plan to gauge the effectiveness of the TMDLs and determine if future revisions are necessary or appropriate to meet applicable water quality standards.

Future stream sampling will occur quarterly on an annual basis at SC038, SC279 and SC106 and bimonthly at rotational station SC744 every fourth year, with 2015 being the next scheduled sampling year at SC744. The monitoring will include dissolved oxygen monitoring and sestonic chlorophyll *a* sampling. Monitoring of tributary levels of total phosphorus during runoff events will help direct abatement efforts toward major nonpoint sources. Monitoring of TP below the outfalls of Frontier Refining and the city of El Dorado in the Walnut River above SC279 will help assess improvements in their nutrient removal processes and their relative contribution to the dissolved oxygen impairment in the Walnut River as monitored at SC279. Monitoring TP below the outfall of the city of Augusta in the Walnut River above SC106 will help assess improvements in their nutrient removal processes. Monitoring TP below the outfalls of the city of Andover and the city of Wichita – Fourmile wastewater treatment facility in Fourmile Creek above SC744 will help assess improvements in their nutrient removal processes. Monitoring of TP should be a condition of the Municipal Separate Storm Sewer System permits within the watershed.

Commencing in 2015, macroinvertebrate and periphyton sampling will occur at SC106 and possibly at other accessible locations on the Whitewater River, Walnut River and Fourmile Creek. The streams will be evaluated for possible delisting after Phase I implementation in 2024. If the biological endpoints are achieved over 2015-2023 at SC106, the conditions described by the narrative nutrient criteria will be viewed as attained and the Whitewater River (SC038), Walnut River (SC279), Walnut River (SC106) and Fourmile Creek (SC744) will be moved to Category 2 on the 2024 303(d) list. If they are not, Phase II of the TMDL document will begin in 2025.

Once the water quality standards are attained, the adjusted ambient phosphorus concentrations in the Whitewater River (SC038), Walnut River (SC279), Walnut River (SC106) and Fourmile Creek (SC744) will be the basis for establishing numeric phosphorus criteria through the triennial WQS process to protect the restored biological and chemical integrity of the Whitewater River (SC038), Walnut River (SC279), Walnut River (SC106) and Fourmile Creek (SC744).

Reasonable Assurance

Reasonable assurance only applies when less stringent wasteload allocation are assigned based on the assumption that nonpoint source reductions in the load allocation will be met [40 CFR § 130.2(i)]. This section can also contain statements made by the state concerning the state's authority to control pollutant loads. States are not required under Section 303(d) of the Clean Water Act to develop TMDL implementation plans and the EPA does not approve or disapprove them. However, this TMDL document provides information regarding how point and nonpoint sources can or should be controlled to ensure implementation efforts achieve the loading reductions identified in this TMDL document. The EPA recognizes that technical guidance and support are critical to determining the feasibility of and achieving the goals outlined in this TMDL document. Therefore, the discussion of reduction efforts relating to point and nonpoint sources can be found in the implementation section of the TMDL document, and are briefly described below.

The states have the authority to issue and enforce state operating permits. Inclusion of effluent limits into a state operating permit and requiring that effluent and instream monitoring be reported to the state should provide reasonable assurance that instream water quality standards will be met. Section 301(b)(1)(C) requires that point source permits have effluent limits as stringent as necessary to meet WQS. However, for wasteload allocations to serve that purpose, they must themselves be stringent enough so that (in conjunction with the water body's other loadings) they meet WQS. This generally occurs when the TMDL(s)' combined nonpoint source load allocations and point source WLAs do not exceed the WQS-based loading capacity and there is reasonable assurance that the TMDL(s)' allocations can be achieved. Discussion of reduction efforts relating to nonpoint sources can be found in the implementation section of the TMDL document.

The following authorities may be used to direct activities in the watershed to reduce pollution:

1. K.S.A. 65-164 and 165 empowers the Secretary of the KDHE to regulate the discharge of sewage into the waters of the state.

2. K.S.A. 65-171d empowers the Secretary of the KDHE to prevent water pollution and to protect the beneficial uses of the waters of the state through required treatment of sewage and established water quality standards and to require permits by persons having a potential to discharge pollutants into the waters of the state.
3. K.S.A. 2002 Supp. 82a-2001 identifies the classes of recreation use and defines impairment for streams.
4. K.A.R. 28-16-69 through 71 implements water quality protection by the KDHE through the establishment and administration of critical water quality management areas on a watershed basis.
5. K.S.A. 2-1915 empowers the Kansas Department of Agriculture, Division of Conservation to develop programs to assist the protection, conservation and management of soil and water resources in the state, including riparian areas.
6. K.S.A. 75-5657 empowers the Kansas Department of Agriculture, Division of Conservation to provide financial assistance for local project work plans developed to control nonpoint source pollution.
7. K.S.A. 82a-901, et. seq. empowers the Kansas Water Office to develop a state water plan directing the protection and maintenance of surface water quality for the waters of the state.
8. K.S.A. 82a-951 creates the State Water Plan Fund to finance the implementation of the Kansas Water Plan, including selected Watershed Restoration and Protection Strategies.
9. The Kansas Water Plan and the Walnut Basin Plan provide the guidance to state agencies to coordinate programs intent on protecting water quality and to target those programs to geographic areas of the state for high priority implementation.

Table 23 of the TMDL document summarizes Phase I and II milestones and actions necessary in the Upper Walnut River watershed.

Funding: The State Water Plan annually generates $16-18 million and is the primary funding mechanism for implementing water quality protection and pollution reduction activities in the state through the Kansas Water Plan. The state water planning process, overseen by the Kansas Water Office, coordinates and directs programs and funding toward watershed and water resources of highest priority. Typically, the state allocates at least 50 percent of the fund to programs supporting water quality protection. This watershed and its TMDL document are located within a high priority area and should receive support for pollution abatement practices that lower the loading of sediment and nutrients.

Effectiveness: Use of biological nutrient removal technology has been well established to reduce nutrient levels in wastewater, including phosphorus. Additionally, nutrient control has been proven effective through conservation tillage, contour farming and use of grass waterways and buffer strips. In addition, the proper implementation of comprehensive livestock waste management plans has proven effective at reducing nutrient runoff associated with livestock facilities.

Desired Implementation Activities:
1. Implement and maintain conservation farming, including conservation tilling, contour farming and no-till farming to reduce runoff and cropland erosion.
2. Improve riparian conditions along stream systems by installing grass and/or forest buffer strips along the stream and drainage channels in the watershed.
3. Perform extensive soil testing to ensure excess phosphorus is not applied.
4. Ensure land applied manure is being properly managed and is not susceptible to runoff by implementing nutrient management plans.
5. Install pasture management practices, including proper stock density to reduce soil erosion and storm runoff.
6. Ensure proper on-site waste system operations in proximity to the main stream segments.
7. Ensure that labeled application rates of chemical fertilizers are being followed and implement runoff control measures.
8. Make operational changes in municipal wastewater treatment plants and implement alternative disposal such as irrigation and, if necessary, install enhanced nutrient reduction technology to reduce wasteloads.
9. Renew state and federal permits and inspect permitted facilities for permit compliance.
10. Facilitate urban storm water management in Wichita, El Dorado, Bel Aire and Andover to abate pollutant loads.

National Pollutant Discharge Elimination System and State Permits:
a. Monitor influent into and effluent from the discharging permitted wastewater treatment facilities, continue to encourage wastewater reuse and irrigation disposal and ensure compliance and proper operation to control phosphorus levels in wastewater discharges.
b. Inspect permitted livestock facilities to ensure compliance.
c. New livestock permitted facilities will be inspected for integrity of applied pollution prevention technologies.
d. New registered livestock facilities with less than 300 animal units will apply pollution prevention technologies.

e. Manure management plans will be implemented, to include proper land application rates and practices that will prevent runoff of applied manure.
f. Reduce runoff in Wichita, El Dorado, Bel Aire and Andover through respective storm water management program and Municipal Separate Storm Sewer System permit.
g. Establish total phosphorus concentration effluent limit or goal of 1 milligrams per liter in the discharge of the city of El Dorado's wastewater treatment facility, city of Augusta's WWTF and in Frontier El Dorado Refining's discharge. Establish a TP concentration effluent limit or goal of 0.75 mg/L in the discharge from the city of Wichita - Fourmile Creek WWTF. Establish a TP concentration permit limit or goal of 1.5 mg/L in the discharge of the city of Andover WWTF.
h. Establish nutrient reduction practices among urban homeowners to manage application on lawns and gardens, through the Wichita, El Dorado, Bel Aire and Andover storm water management programs.