

# PAPILLION CREEK WATERSHED MANAGEMENT PLAN

2019 UPDATE



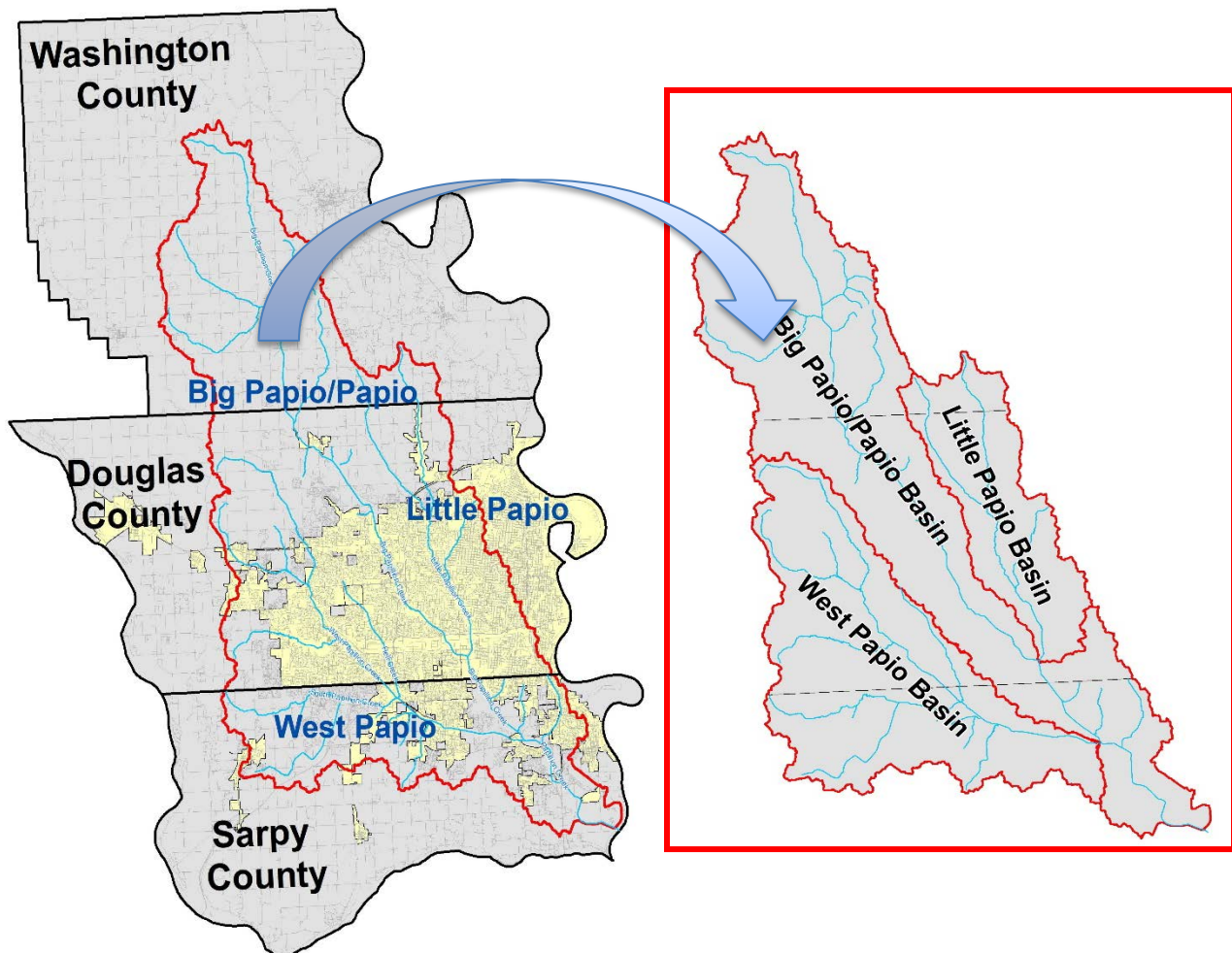
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## Executive Summary

### E.1 Background and Purpose

Improved stormwater management within the Papillion Creek Watershed (Watershed) has been the on-going objective of the Papillion Creek Watershed Partnership (PCWP) since its formation in August 2001. The Watershed covers approximately 400 square miles of drainage area extending from northern Washington County southward through Douglas and Sarpy Counties and ultimately discharges to the Missouri River south of Bellevue – see Figure E-1. The major subwatersheds are commonly referred to as Big Papio/Papio, Little Papio, and West Papio. “Papio” is a common abbreviation in reference to the Papillion Creek streams and subwatersheds. PCWP members presently consist of the cities of Bellevue, Boys Town, Gretna, La Vista, Omaha, Papillion, and Ralston; Sarpy County; and the Papio-Missouri River Natural Resources District (P-MRNRD).

Figure E-1 Papillion Creek Watershed



It is the desire of the PCWP, every 5 years, to review the Watershed Management Plan and specifically update the plan components: 1) Watershed Fees framework and rates and 2) the Implementation Plan with respect to availability of needed funds and rate of development within the Watershed. This 2019 Update represents the second effort to update the Implementation Plan (last update was in 2014). The 2019 Update is intended to provide interim progress updates for the various management practices. Specifically, the financial needs for the entire list of remaining structural projects were evaluated so that the PCWP could reach consensus for the necessary long-term and near-term strategies, including defining the Program structural projects for the fiscal year (FY) planning period FY 2020 to FY 2024<sup>1</sup>.

## E.2 2019 Review and Update

The following text summarizes the general efforts and findings from the 2019 Update:

**Water Quality Evaluation:** The Nebraska Department of Environmental Quality (NDEQ) updated its various water quality impairment listings in 2018 for area lakes and stream segments. Additional details are covered in this 2019 Update.

**Peak Flow Reduction Evaluation:** No additional technical analyses were conducted for the 2019 Update. P-MRNRD retained the professional services of FRYA to update the hydrologic analyses for the Papillion Creek Watershed. The *Papillion Creek Watershed Hydrologic Analysis Report* was published in 2017 and reflects 2013 land use conditions, constructed and planned regional detention structures, and updates to temporal rainfall distributions and areal reduction factors.

**Status of FY 2015 to FY 2019 Watershed Implementation Plan:** Projects identified in the 2014 Update as Program Projects are listed in Table E-1. P-MRNRD constructs the projects on behalf of the PCWP. Table E-1 provides an updated completion status and cost obligations of the FY 2015 to FY 2019 Program Projects. After escalating the 2013 estimated project costs shown in the 2014 Update for the three structures (\$32.1M) under construction, the current estimated completion costs of these structures are nearly the same (\$32.7) in 2018 dollars. Preliminary design on six planned regional detention structures in areas experiencing or in close proximity to urbanization growth was also completed.

**Proposed Watershed Management Plan:** The Watershed Management Plan Update deals primarily with the continuation of how to implement the remaining water quality and structural flood control projects. Table E-2 shows the proposed list of remaining structural projects, along with updated estimated capital costs. The project sequencing for some water quality basins has changed to reflect recent changes in development interest, management priorities, and financial constraints. Figure E-2 shows the locations of the remaining structural projects.

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<sup>1</sup> Fiscal years run from July 1-June 30. FY 2020 begins July 1, 2019 and ends June 30, 2020.

**Table E- 1 Status of Previous Program Projects**

Structure Name	Approx. Location & Planning Jurisdiction	Drainage Area (acres)	Estimated Project Funding Sources (Millions of \$)			Current Status
			NRD Fund & Watershed Fees [1]	Other [2]	Total Estimated Project Cost	
<b>2014 Program Projects for Years FY 2015 to FY 2019</b>						
WP-6	126th & Cornhusker Road; Papillion	1,260	\$9	\$4.5	\$13.5	Construction Began Fall 2018 with Fall 2020 Completion
WP-7	126th & Cornhusker Road; Sarpy County	450	\$4	\$5	\$9.0	Construction Began Fall 2018 with Fall 2020 Completion
Totals:						
<b>Other Projects Completed</b>						
WQ-Zorinsky 2	Upstream of Zorinsky Lake; Omaha	920	\$10.2		\$10.2	Construction Began Spring 2018 with Spring 2020 Completion
<b>Preliminary Studies Completed</b>						
Dam Site 7	168th Street & Bennington Road; Bennington/Omaha	1,675	\$3.9		\$3.9	Design Began on WP-1
Dam Site 12	216th & Fort Streets; Omaha	1,660				
Dam Site 19	192nd Street & West Giles Road; Sarpy County	2,750				
WP-1	180th & Fort Streets; Omaha	865				
WP-2	180th Street & Giles Road; Sarpy County	705				
WP-4	204th Street and Schram Road; Gretna	670				
Totals:			\$27.1	\$9.5	\$36.6	

Notes:

[1] No bonding proceeds were used to fund projects.

[2] Other includes reimbursement for project enhancements by city or county and local and/or state grant funding.

**Table E- 2 Summary of Estimated Capital Costs for Remaining Program Projects**

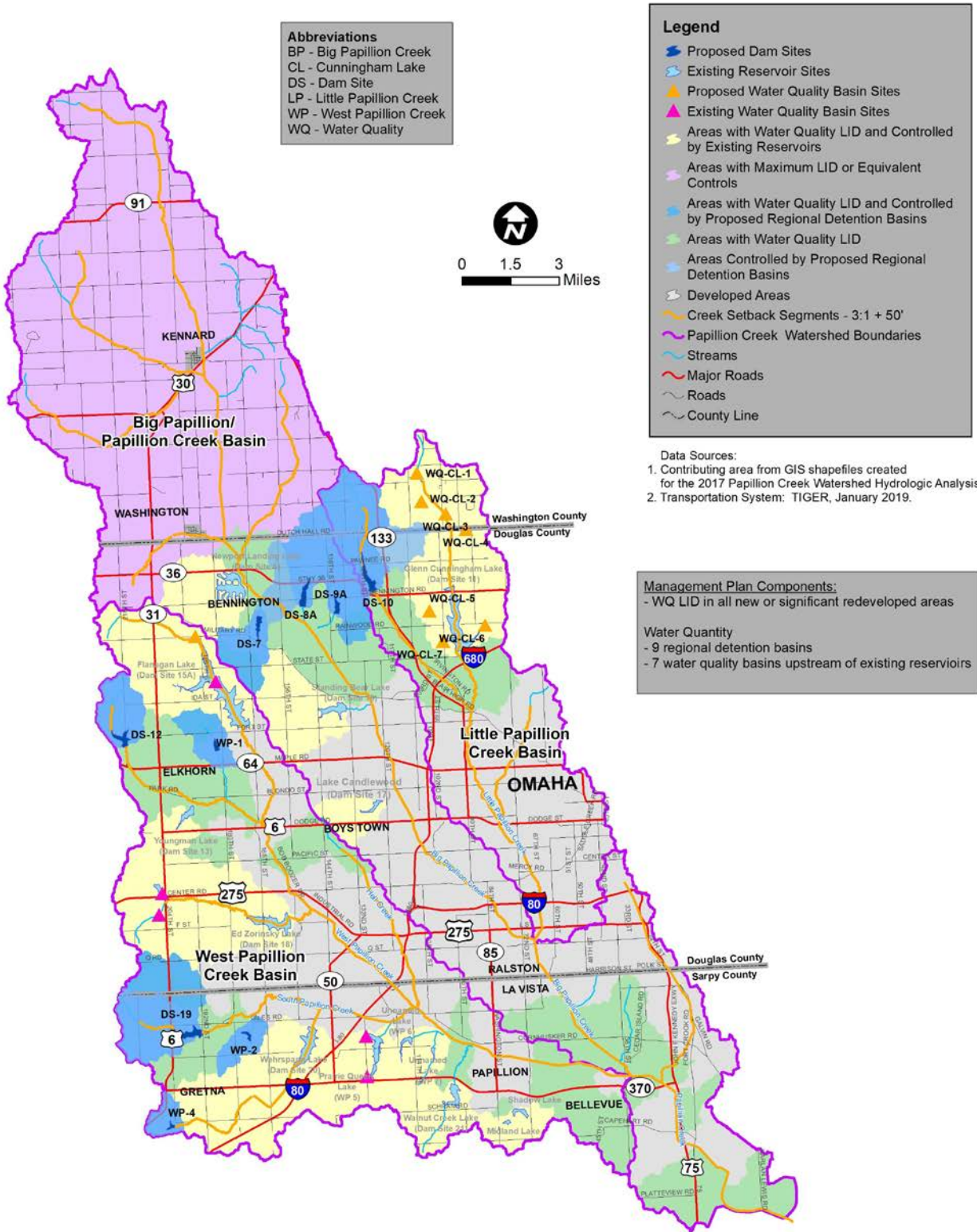
Structure Name	Stream Reach	Approx. Location/Jurisdiction	Drainage Area (acres)	Est. Normal Pool Area (Acres)	Est. Project Costs, 2018 Basis (Millions of \$) <sup>1</sup>		
					Construction Cost <sup>2</sup>	Real Estate Costs	Total Est. Project Capital Cost
WP-1	Trib. to West Papillion Creek	180 <sup>th</sup> & Fort St.	865	20	\$8.2	\$5.3	\$13.5
WP-4	Trib. to South Papillion	204 <sup>th</sup> & Schram Road	670	15	\$7.2	\$4.9	\$12.1
WP-2	Trib. to South Papillion Creek	180 <sup>th</sup> & Giles Road	705	17	\$5.4	\$4.1	\$9.5
DS 19	South Papillion Creek	192nd & Giles Road	2,750	74	\$12.0	\$16.6	\$28.6
DS 12	West Papillion Creek	216th & Fort Streets	1,660	43	\$11.7	\$13.3	\$25.0
DS 7	Trib to Big Papillion Creek	168th & Bennington Road	1,675	43	\$10.1	\$9.1	\$19.2
DS 8A	Trib to Big Papillion Creek	144th St & Bennington Road	1,850	75	\$7.3	\$9.2	\$16.5
DS 9A	Trib to Big Papillion Creek	132nd & Bennington Road	1,280	38	\$5.4	\$5.8	\$11.2
DS 10	Thomas Creek	120th & Bennington road	2,950	97	\$6.1	\$17.9	\$24.0
<b>Regional Basin Subtotal</b>					<b>\$73.4</b>	<b>\$86.2</b>	<b>\$159.6</b>
WQ-CL-6	Upstr. Cunningham Lake	Omaha	510		\$4.1	\$5.9	\$10.0
WQ-CL-5	Upstr. Cunningham Lake	Omaha	470		\$4.0	\$5.7	\$9.7
WQ-CL-7	Upstr. Cunningham Lake	Omaha	200		\$3.1	\$4.4	\$7.4
WQ-CL-4	Upstr. Cunningham Lake	Omaha & Washington Co.	915		\$6.2	\$8.8	\$15.0
WQ-CL-2	Upstr. Cunningham Lake	Washington Co.	845		\$6.0	\$8.5	\$14.5
WQ-CL-3	Upstr. Cunningham Lake	Washington Co.	790		\$5.8	\$8.2	\$14.0
WQ-CL-1	Upstr. Cunningham Lake	Washington Co.	740		\$5.8	\$8.2	\$14.0
<b>Water Quality Basin Subtotal</b>					<b>\$35.0</b>	<b>\$49.7</b>	<b>\$84.7</b>
<b>Total Regional Detention and Water Quality Basins Total</b>					<b>\$108.4</b>	<b>\$135.9</b>	<b>\$244.3</b>

Notes:

[1] Does not include inflation, total program costs are escalated to year of expenditure in cash flow analysis.

[2] Construction costs include dam construction, utilities/infrastructure relocation/replacement, recreation construction, permitting and engineering.

Figure E- 2 2019 Watershed Management Plan Update for Full Build-Out Conditions



Financial modeling was conducted for 5 project funding scenarios. Each modeling scenario identified the number of remaining structural projects that could likely be completed within the planning period ending in FY 2050. The following components provided inputs to the financial modeling scenarios:

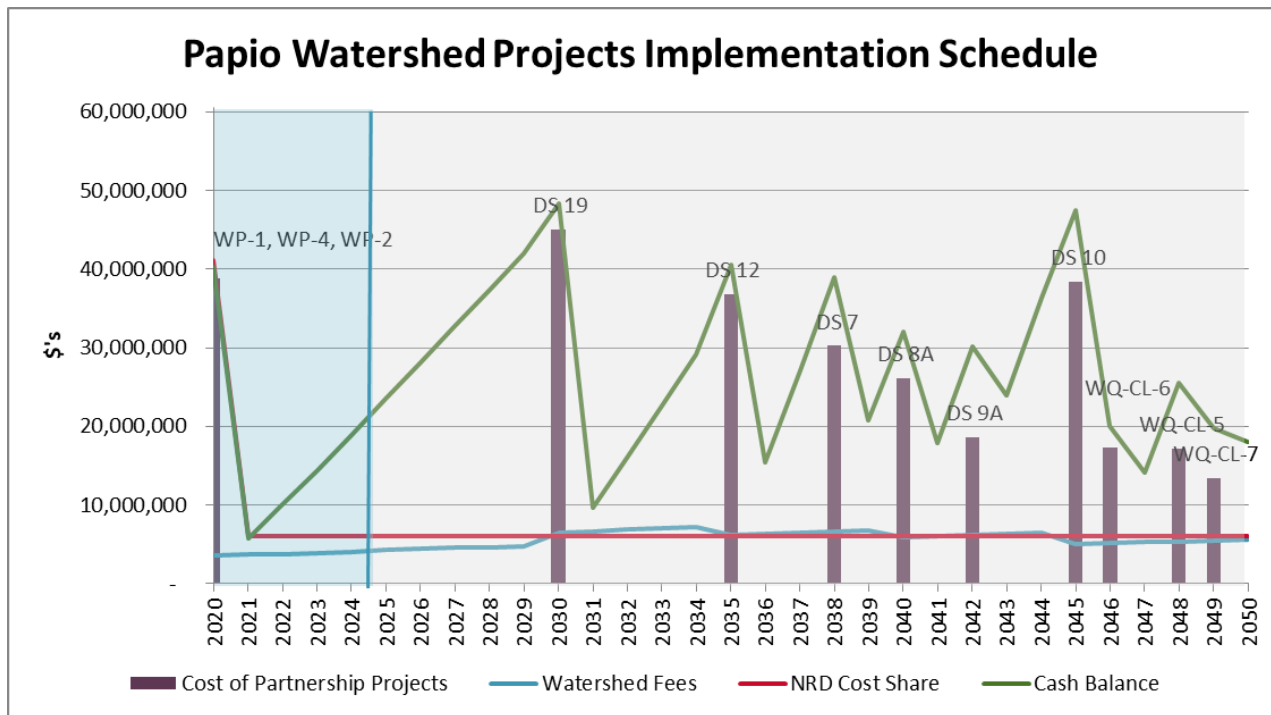
- Updated land use maps to help establish spatial relationships of existing and future development relative to the approximate timing of remaining structural projects.
- Updated population and land use projections. Progressive land consumption from development forms the basis for Watershed Management Fee (Watershed Fee) revenue stream projections. Watershed Fees are assessed to developers and home builders based on projected capital costs for structural projects, projected land consumption, and the underlying intent to maintain a ratio of 1/3 private to 2/3 public financing for the overall structural program projects as per Root Policy Group #6 in Appendix B.
- The Papio-Missouri River Natural Resources District (P-MRNRD) Long-Range Implementation Plan (LRIP). This document formed the basis for probable available General Fund allocations for structural projects.
- Annual bond repayment obligations. Current P-MRNRD bond obligations are approximately \$5 million per year for three existing bonds totaling approximately \$71.5 million that will expire in 2030, 2033, and 2034 respectively. Approximately \$26 million in remaining bonding capacity exists and was also considered.
- The Program Project planning period is five years.

**FY 2020 to FY 2024 Implementation Plan:** The Implementation Plan addresses proposed Program Projects and funding needs for the FY 2020 to FY 2024 planning period as follows:

- Financial and administrative needs to implement the proposed Program Projects were identified.
- A number of scenarios were studied to help identify a reasonable revenue generation strategy to fund the Program Projects. Figures E-3 and E-4 depicts Project Funding Scenarios 2A and 2B as reasonable baseline means for project financing using pay-as-you-go (P-A-Y-G with Bonding) using General Fund allocations at the existing P-MRNRD mill levy, along with the proposed Watershed Fee Schedule and bonding. Under this funding strategy, all of the remaining 9 regional detention basin projects could potentially be implemented and 4 of the 7 remaining water quality basin projects could be implemented.



**Figure E- 3 Scenario 2A: P-A-Y-G with Existing Mill Levy and Bond \$26 Million to Fund Construction of Program Projects**



**Figure E- 4 Scenario 2B: P-A-Y-G with Existing Mill Levy and Bond \$26 Million to Fund Construction of Program Projects and Fund Targeted Land Purchases**

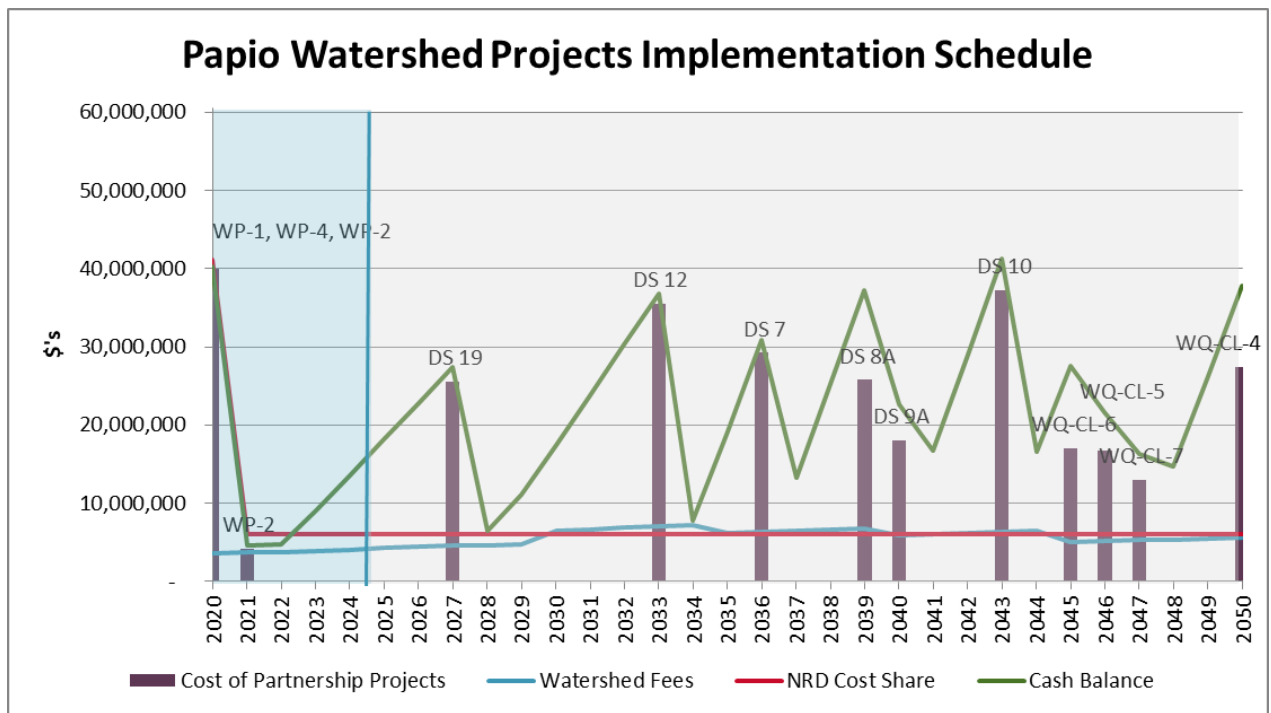


Table E-3 identifies the three structural projects that were selected by the PCWP for the FY 2020 to FY 2024 Implementation Plan and their projected costs.

**Table E- 3 Watershed Management Plan Program Projects for Years FY 2020 to FY 2024**

<b>Structure</b>	<b>Approx. Location &amp; Planning Jurisdiction</b>	<b>Drainage Area (acres)</b>	<b>Est. Project Capital Costs, 2018 Basis, \$ Millions</b>
WP-1	180th & Fort St., Omaha	865	\$13.5
WP-4	204th & Schram Road; Gretna	670	\$12.1
WP-2	180th & Giles Road; Sarpy County	705	\$9.5
<b>Total</b>			<b>\$35.1</b>

Note: The abbreviation “WP” = West Papillion Creek Watershed.

Table E-4 contains the schedule of Watershed Fees selected by PCWP for the FY 2020 to FY 2024 planning period.

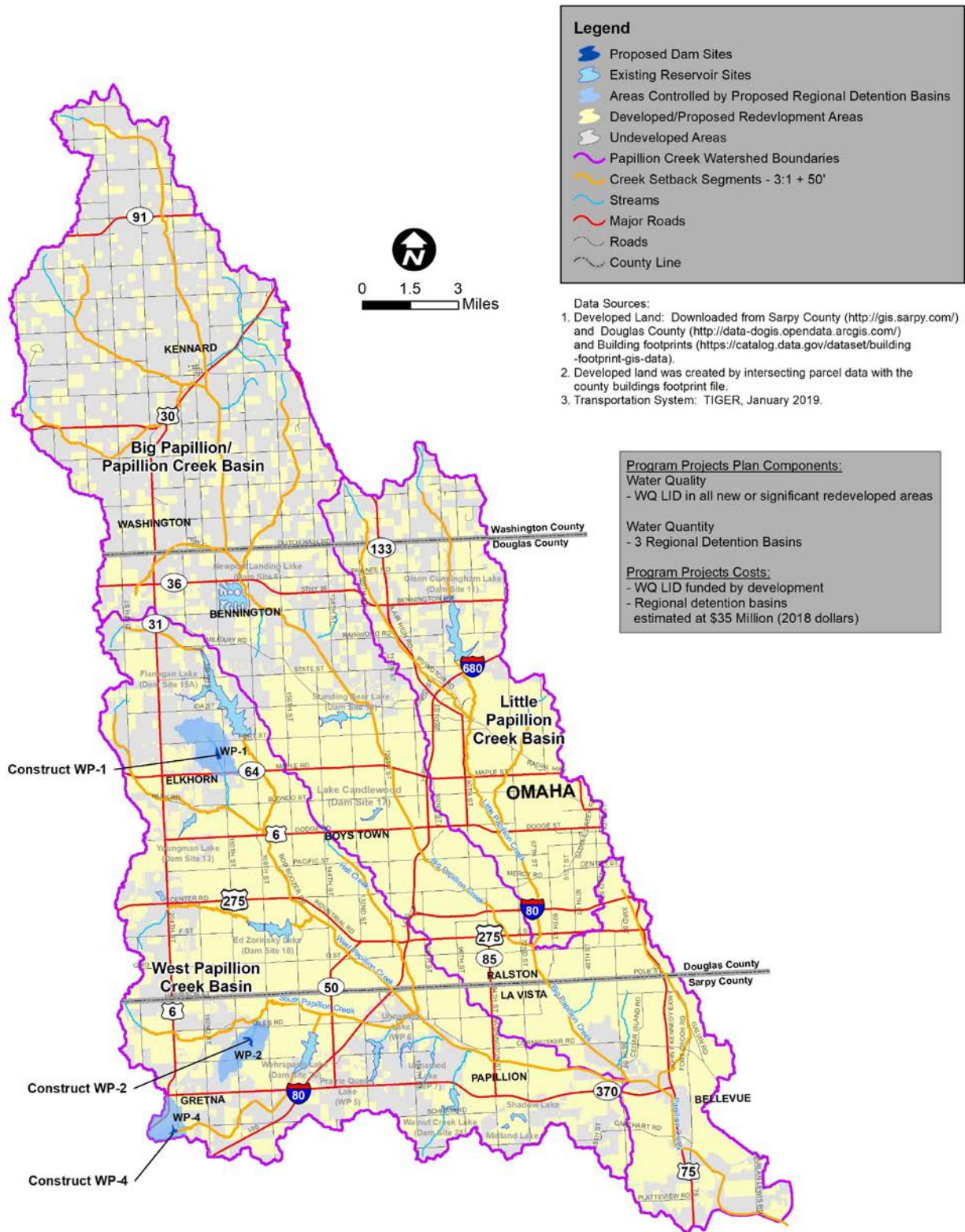
**Table E- 4 Schedule of Watershed Fees for Years FY 2020 to FY 2024**

<b>Fee Category</b>	<b>Current (FY 2019)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>
Single Family Residential per housing unit or dwelling unit (also includes low-density multi-family up to 4-plexes)	\$908	\$931	\$954	\$978	\$1,002	\$1,027
High-Density Multi-Family Residential (beyond 4-plexes) per gross developable acre	\$3,995	\$4,095	\$4,197	\$4,302	\$4,410	\$4,520
Commercial/Industrial per gross developable acre	\$4,842	\$4,963	\$5,087	\$5,214	\$5,345	\$5,478

Note: The annual increase for FY 2020 to FY 2024 is 2.5 percent per year.

Figure E-5 represents the Implementation Plan, depicting the locations for the proposed three Program Projects for the FY 2020 to FY 2024 planning period.

Figure E-5 Papillion Creek Watershed Implementation Plan (FY 2020 to FY 2024)



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## 1.0 Update Purpose

This Papillion Creek 2019 Watershed Management Plan Update (2019 Update) is intended to provide interim progress updates from the 2014 Watershed Management Plan Update (2014 Update) for the various Watershed management practices. Therefore, this 2019 Update includes:

- A summary of the current water quality impairments within the Watershed.
- Update on the Watershed hydrology.
- As required in the Papillion Creek Watershed Partnership (PCWP) interlocal agreement, at approximately 5 year intervals, the PCWP and the development community are to review the Watershed Management Fees (Watershed Fees) framework and rates, the Watershed Management Plan for remaining structural projects, and the Implementation Plan for the structural Program Projects selected for potential funding and construction for the next planning period. For this 2019 Update, the next Program Project planning period has been established by the PCWP as a 5-year period extending from FY 2020 to FY 2024.

## 2.0 Watershed Description

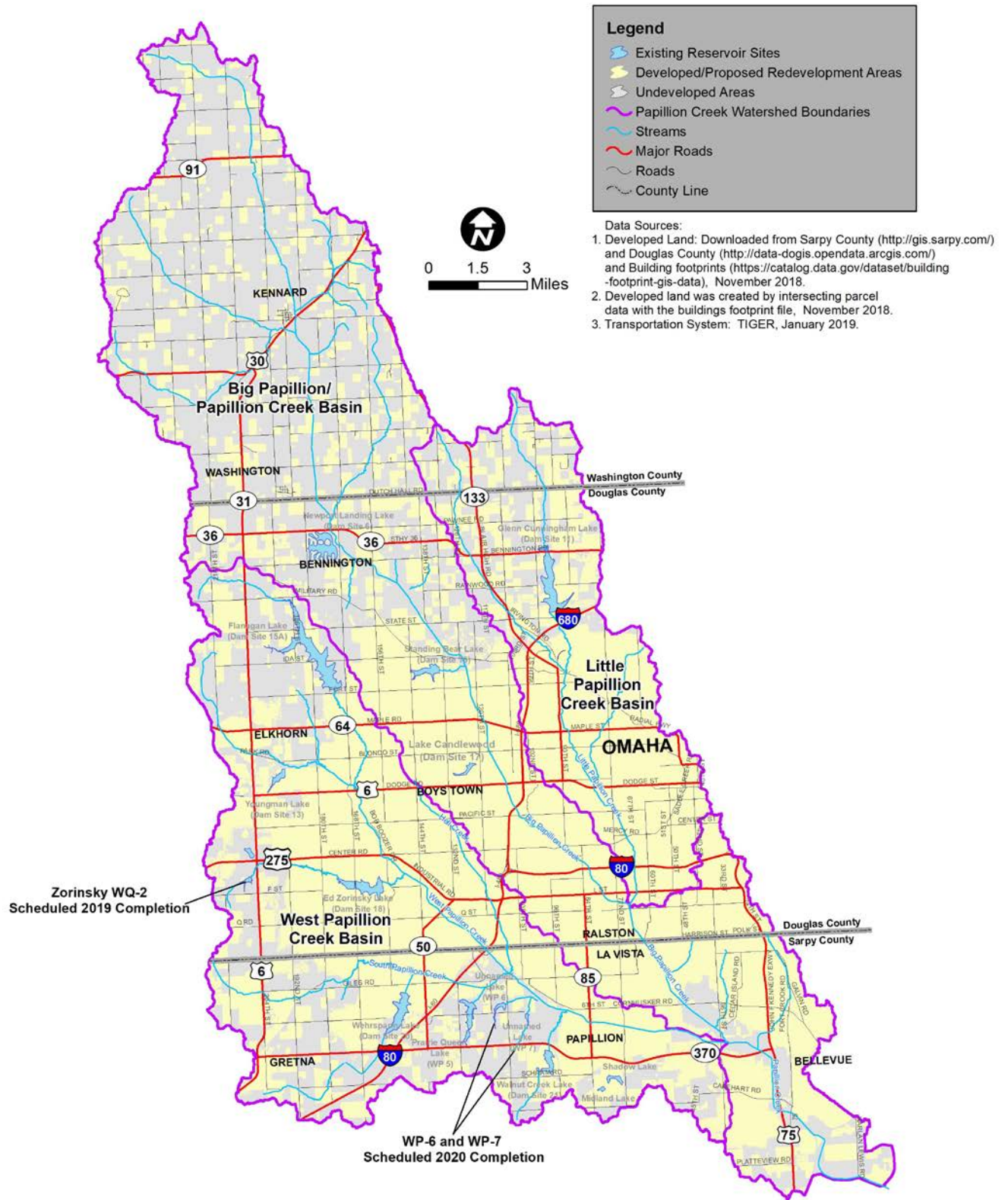
The Watershed is depicted in Figure 1 and drains an area of approximately 400 square miles (mi<sup>2</sup>). Approximately one-half of the Watershed is located within Douglas County, and the other half is divided nearly equally between Washington and Sarpy Counties. Primary streams in the Watershed include Big Papillion, Little Papillion, West Papillion, and Papillion Creeks. Little Papillion Creek drains approximately 60 mi<sup>2</sup> and flows into the Big Papillion Creek near 66th and Q Streets in Omaha. Big Papillion Creek has a drainage area of approximately 233 mi<sup>2</sup> and extends northward into Washington County and includes the tributary drainage area of Little Papillion Creek. The drainage area of West Papillion Creek is approximately 135 mi<sup>2</sup>. The Big Papillion and West Papillion Creeks form Papillion Creek at their confluence near 36th Street and Gilmore Road in Bellevue.

## 3.0 Water Quality Impairments

Nebraska Department of Environmental Quality (NDEQ) publishes key pollutants of concern (POCs) for Nebraska water bodies. The Papillion Creek Watershed lies within NDEQ's Missouri River Tributaries, Sub-basin MT1, which extends from approximately the middle of Dakota County southward through Sarpy County. The latest NDEQ report listing water quality impairments is documented in the *2018 Water Quality Integrated Report, April 01, 2018*.

# 2019 Watershed Management Plan Update

Figure 1 Papillion Creek Watershed





## 3.1 Basis for Water Quality Impairments

Surface water in Nebraska is primarily regulated by NDEQ's *Title 117 - Nebraska Surface Water Quality Standards*. Water quality criteria are based on the designated beneficial use classifications of the various lake and stream water bodies. Designated beneficial uses within the Watershed include:

- **Primary Contact Recreation:** Human exposure to pathogens, as indicated by *Escherichia coliform (E. coli)* bacteria that are commonly found in the lower intestines of warm-blooded animals and humans. *E. coli* bacteria are a subset of fecal coliform bacteria, and human exposure in protected water bodies is typically due to swimming and wading.
- **Aquatic Life:** Potential toxicity to aquatic community and suitability of habitat.
- **Fish Consumption Advisories:** Triggered by POCs, such as carcinogens, which exceed established criteria and, therefore, may pose a human health risk.
- **Water Supply:** Public Drinking Water Supply and/or Agricultural Water Supply.
- **Aesthetics:** Degradation of water clarity and overall visual appearance of a water body due to discoloration, sedimentation, Chlorophyll "a" content (algae production), and nutrient enrichment.

The Papillion Creek Watershed lies within NDEQ's Missouri River Tributaries, Sub-basin MT1. See Figure 2, which has been extracted from NDEQ's *2018 Water Quality Integrated Report, April 01, 2018*. The only beneficial use that will not apply within the Papillion Creek Watershed will be that for Public Drinking Water Supply. Under the Aquatic Life beneficial use, the various tributary segments are classified as Warmwater "A", which is the most protective warmwater classification, due to their proximity to urban development.

Currently, Sub-basin MT1 has several water bodies (both lakes and stream segments) that are listed as impaired for water quality by NDEQ in the most recent *2018 Water Quality Integrated Report*. There are other stream segments within the Watershed that were not listed in Table 1. The segments that are unlisted are due to either water quality assessments that have not yet been completed or a determination that the unlisted segments have been ranked as "supporting" of designated beneficial uses. Therefore, such unlisted stream segments may or may not be of future regulatory concern. It is at NDEQ's discretion as to whether or not to pursue regulatory enforcement actions for the various listed impairments.

## 3.2 Water Quality Impairments

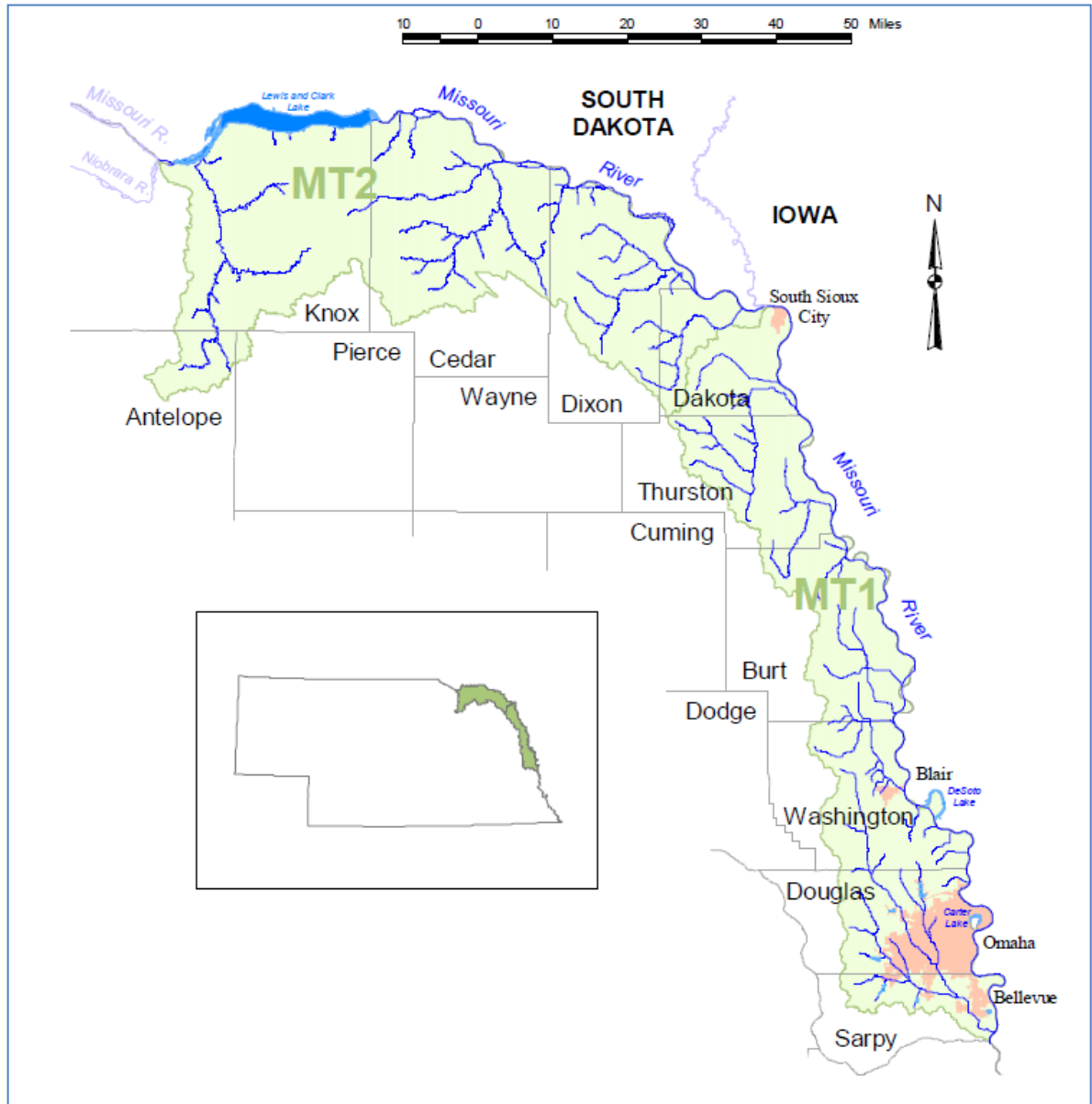
The locations of the 2018 impairments are shown in Figure 3, and the impairments are summarized in Table 1, along with the water quality impairments that were previously listed in the 2014 Report, based on NDEQ's *2008 and 2012 Water Quality Integrated Reports*.

The key comparative results of the 2012 and 2018 impairment listings for pollutants of concern (POCs) are generally as follows:

- Walnut Creek Lake has been newly listed as impaired for nutrients (Total Nitrogen and Total Phosphorus) and *E. coli Bacteria*.
- Wehrspann Lake has been newly listed as impaired for Chlorophyll "a".

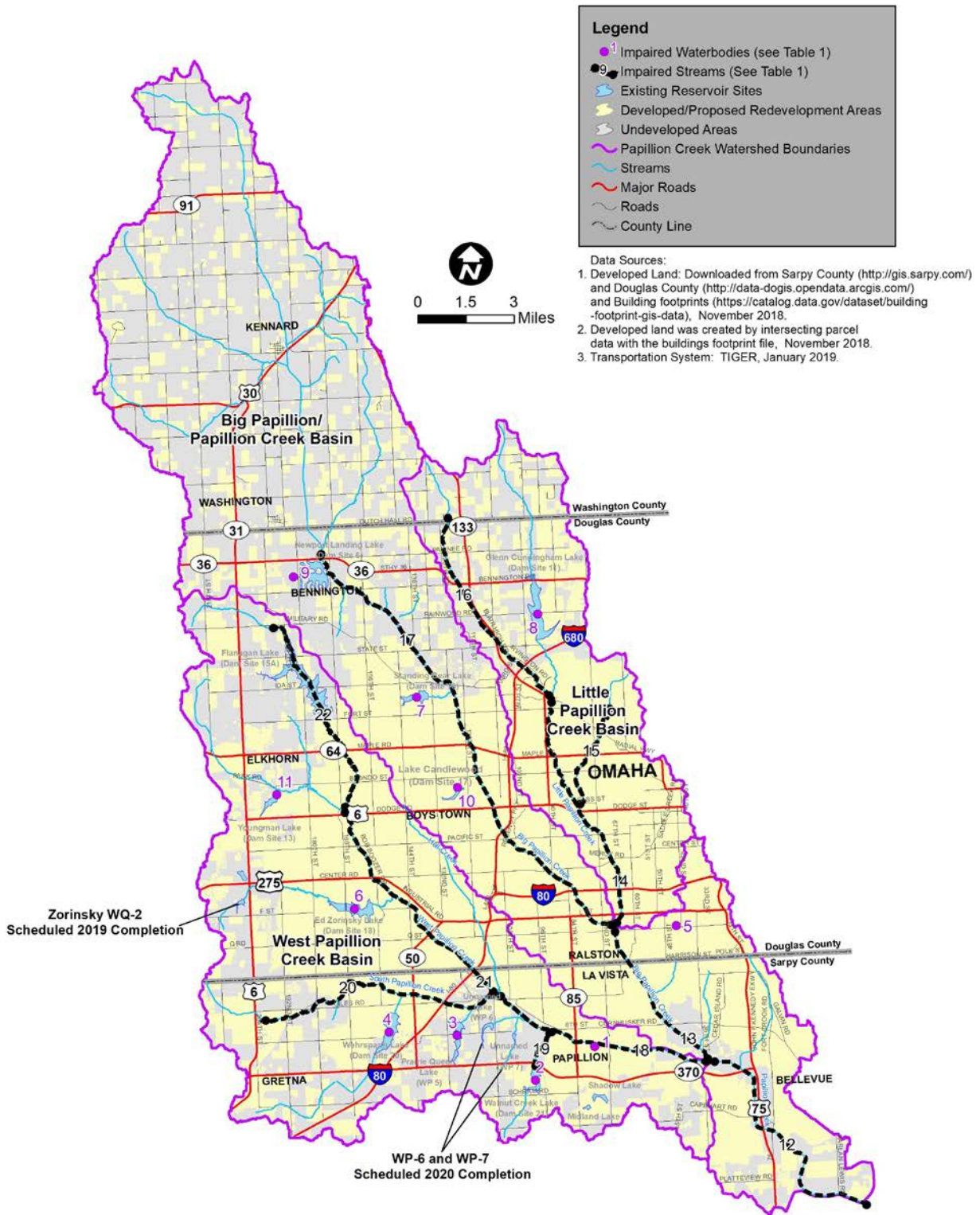
# 2019 Watershed Management Plan Update

**Figure 2** Papillion Creek Watershed within NDEQ's Missouri River Tributaries Sub-Basin MT1



# 2019 Watershed Management Plan Update

**Figure 3** Locations of NDEQ 2018 Water Quality Impairments within Watershed  
(Use in Conjunction with Table 1)



# 2019 Watershed Management Plan Update

**Table 1 April 2018 NDEQ Water Quality Impairments in the Watershed  
(Use in Conjunction with Figure 3)**

Figure 3 Map Pt.	NDEQ Waterbody ID	Waterbody	2012 WQ Impairments							2018 WQ Impairments								
			Sediment	Diss. Oxygen	Nutrients (TN and TP)	Chlorophyll a	E. coli Bacteria	pH	Cancer Risk Compounds [1]	Hazard Index Compounds [2]	Selenium	Mercury	Sediment	Diss. Oxygen	Nutrients (TN and TP)	Chlorophyll a	E. coli Bacteria	pH
<b>Lakes</b>																		
1	MT1-L0023	Halleck Park (Papillion)							X									
2	MT1-L0025	Walnut Creek Lake (DS 21)				X			X	X			X	X	X			X
3	MT1-L0027	Prairie Queen Lake											X	X				X
4	MT1-L0030	Wehrspann Lake (DS 20)			X				X	X			X	X				X
5	MT1-L0040	Hitchcock Park Lake						X									X	
6	MT1-L0050	Ed Zorinsky Lake (DS 20)			X	X			X	X			X	X				
7	MT1-L0100	Standing Bear Lake (DS 16)	X		X	X			X	X	X	X	X	X				X
8	MT1-L0120	Glenn Cunningham Lake (DS 11)			X	X							X	X				X
9	MT1-L0135	Prairie View Lake																X
10	MT1-LXXX1	Candlewood Lake (DS 17)	X															
11	MT1-LXXX2	Lawrence Youngman Lake (DS 13)											X					X
<b>Streams</b>																		
12	MT1-10100	Papillion Creek (Mo River to W. Papio Confluence)					X		X	X	X						X	
13	MT1-10110	Big Papillion Creek (W. Papio Confluence to Little Papio Confluence)					X										X	
14	MT1-10111	Little Papillion Creek (Big Papio Confluence to Thomas Creek Confluence)					X										X	
15	MT1-10111.1	Cole Creek (Little Papio Confluence to 0.5 mi North of Ames Ave)		X			X						X				X	
16	MT1-10111.2	Thomas Creek (Little Papio Confluence to 0.25 mi N of Dutch Hall Rd)	Aquatic Life Impaired but Parameters Unknown							Aquatic Life Impaired but Parameters Unknown								
17	MT1-10120	Big Papillion Creek (Little Papio Confluence to Butter Flat Creek Confluence)					X										X	
18	MT1-10200	West Papillion Creek (Big Papio Confluence to South Papio Confluence)					X										X	
19	MT1-10210	Walnut Creek (West Papio Creek Confluence to 0.5 mile South of Schram Rd)	Aquatic Life Impaired but Parameters Unknown							Aquatic Life Impaired but Parameters Unknown								
20	MT1-10240	South Papillion Creek (Unnamed Creek Confluence to 0.8 mile West of 192 <sup>nd</sup> St)	Aquatic Life Impaired but Parameters Unknown							Aquatic Life Impaired but Parameters Unknown								
21	MT1-10250	West Papillion Creek (South Papio Confluence to North Branch Confluence)							X	X								
22	MT1-10252	West Papillion Creek, North Branch (West Papio Creek Confluence to 0.9 mile North of State St)	Aquatic Life Impaired but Parameters Unknown							Aquatic Life Impaired but Parameters Unknown and Aesthetics Impaired by Trash								

**Notes**

- [1] Cancer Risk Compounds include Aroclor-1248 (PCB-1248), Aroclor-1260 (PCB-1260), cis-chlordane, Chlordane, trans-chlordane, DDD, DDE, DDT, Dieldrin, Heptachlor, Heptachlor Epoxide, Hexachlorobenzene, cis-nonachlor, trans-nonachlor, Oxychlordane, Pentachloranisole, and Tifluralin.
- [2] Hazard Risk Compounds include Aroclor-1254 (PCB-1254), Lindane (g-BHC), cis-chlordane, Chlordane, trans-chlordane, DDT, Dieldrin, Heptachlor, Heptachlor Epoxide, Hexachlorobenzene, cis-nonachlor, trans-nonachlor, Oxychlordane, Pentachloranisole, Mercury, Cadmium, and Selenium.

- Four area lakes (Prairie Queen Lake, Glenn Cunningham Lake, Prairie View Lake, and Lawrence Youngman Lake) have been newly listed for impairments due to Mercury. Ed Zorinsky Lake has been delisted as impaired for Mercury.
- Five area lakes (Halleck Park Lake, Walnut Creek Lake, Wehrspann Lake, Ed Zorinsky Lake, and Standing Bear Lake) are not listed as impaired for Hazard Index Compounds.
- The North Branch of West Papillion Creek has been newly listed as impaired due to trash.
- Two stream segments (Papillion Creek and West Papillion Creek) are not listed as impaired for Cancer Risk Compounds and Hazard Risk Compounds. This is a regrouping/reclassification of impairments since the 2012 assessment.
- The segment of Papillion Creek from its mouth at the Missouri River to the confluence with West Papillion Creek has been delisted as impaired for Selenium.

NDEQ continues working cooperatively with the Papillion Creek Watershed Partnership (PCWP), and NDEQ may elect to gather more data within the Watershed with respect to on-going water quality improvement projects sponsored by the PCWP.

### 4.0 Watershed Hydrology

No new modeling was conducted as part of the 2019 Update. In 2017, a hydrologic report on the Papillion Creek Watershed was published and provided flows for existing and future build-out peak discharges the 10-, 25-, 50-, 100-, and 500-year return interval storms. The updated hydrology reflected current (2013) land use conditions, recently constructed and planned regional retention structures, and updated the precipitation temporal distributions and areal reduction factors. The 2017 updated hydrology verified calibration efforts against new storm events, recalibrated hydrologic models, and verified storm sizing for sub-watersheds.

The precipitation temporal distributions in the 2017 hydrology report were based on three storm types that could potentially occur over the Papillion Creek Watershed. The storm types are: 1) local, 2) hybrid, and 3) general storms. A sensitivity analysis was completed to determine the most conservative storm to be used for design and it was determined to be the local storm.

### 5.0 Watershed Management Plan

The 2009 Watershed Management Plan integrated water quality and peak flow reduction needs through a series of detailed evaluations of various strategies throughout the Watershed. These strategies had variations in the placements of WQ LID measures<sup>1</sup>; flood protection regional detention basin structures; water quality basins upstream of the regional detention basins; and a strategy termed Maximum Low Impact Development (Max LID)<sup>2</sup>, which was intended to provide

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<sup>1</sup> WQ LID represents engineered control measures to improve overall water quality and decrease stream bank erosion. WQ LID measures are to be implemented for all new development and significant redevelopment throughout the Douglas-Sarpy County portion of the Watershed. WQ LID provisions must capture the first 0.5 inches of net runoff (“first flush” of pollutants) from all storms, as well as providing “no net increase” in peak flows from a 2-year storm relative to pre-development baseline conditions.

<sup>2</sup> Max LID includes the basic features of WQ LID, plus provides sufficient additional on-site detention to provide protection for 100-year storm event.

an alternate means of both peak flow reduction and water quality protection in lieu of regional detention basins and water quality basins.

This section provides a summary of the Watershed Management Plan refinements as follows:

- Current status of structural Program Projects that were originally scheduled for the FY 2015 to FY 2019 time frame.
- Updated 2018 and future land use maps (reference Appendix A).
- Updated population and land use projections were provided by Metropolitan Area Planning Agency (MAPA). Reference Appendix A for the 2050 model outputs.
- Estimated capital cost and cash-flow requirements to fund the remaining structural projects (regional detention basins and water quality basins). (Appendix A)
- Minor revisions were made to the Watershed management policies to reflect current regulatory language (reference Appendix B).

### 5.1 Structural Components: FY 2015 to FY 2019 Program Project Status

During development of the 2009 Plan, a suite of regional detention basins were screened for relative flood protection performance effectiveness and implementation priority/scheduling. In the 2009 Plan, fourteen (14) regional detention basins were selected as candidate structures.

Table 2 summarizes the current status of the Program Projects for the FY 2015 to FY 2019 Implementation Plan identified in the 2009 Report. Projects under construction or under development include the following:

- In November 2018, construction began on regional detention basin WP-6 and WP-7. WP-6 is located near 114<sup>th</sup> Street and Cornhusker Road and WP-7 is located near 108<sup>th</sup> and Cornhusker Road in Sarpy County. These projects provides both flood control along West Papillion Creek and recreational opportunities for surrounding areas. The WP-6 main dam creates a 34 surface acre lake, while WP-7 creates a 13 surface acre lake. Major components of the WP-6 project include an earthen embankment dam, upstream water quality basin, pedestrian trail, recreational area with a boat ramp and in-reservoir fishery enhancements. Construction completion is scheduled for the fall of 2020. Major components of the WP-7 project include an earthen embankment dam, upstream water quality basin, pedestrian trail, recreational area with a kayak launch and in-reservoir fishery enhancements. Construction completion is scheduled for the fall of 2020.
- In February 2018, the P-MRNRD Board of Directors voted to fund the construction of Zorinsky Water Quality Basin No. 2 to be located west of 204<sup>th</sup> Street and between West Center Road and F Street in Douglas County. This water quality basin provides benefits to Zorinsky Lake along Boxelder Creek. The project will trap sediment from an upstream area of approximately 1.6 square miles and provide a 20-acre lake for public water-based recreation. Upon construction of the project, the City of Omaha will maintain the site as a city park. Construction began in the spring of 2018 with completion slated for the spring of 2020.

**Table 2 Status of 2014 Implementation Plan for Years FY 2015 to FY 2019**

Structure Name	Approx. Location & Planning Jurisdiction	Drainage Area (acres)	Estimated Project Funding Sources (Millions of \$)			Current Status
			NRD Funds & Watershed Fees [1]	Other [2]	Total Estimated Project Cost	
<b>2014 Program Projects for Years 2014 to 2018</b>						
WP-6	126th & Cornhusker Road; Papillion	1,260	\$9	\$4.5	\$13.5	Construction Began Fall 2018 with Fall 2020 Completion
WP-7	126th & Cornhusker Road; Sarpy County	450	\$4	\$5	\$9.0	Construction Began Fall 2018 with Fall 2020 Completion
Totals:						
<b>Other Projects Completed</b>						
WQ-Zorinsky 2	Upstream of Zorinsky Lake; Omaha	920	\$10.2		\$10.2	Construction Began Spring 2018 with Fall 2019 Completion
<b>Studies Completed</b>						
Dam Site 7	168th Street & Bennington Road; Omaha/Bennington	1,675	\$3.9		\$3.9	Design Began on WP-1
Dam Site 12	216th & Fort Streets; Omaha	1,660				
Dam Site 19	192nd Street & West Giles Road; Sarpy County	2,750				
WP-1	180th & Fort Streets; Omaha	865				
WP-2	180th Street & Giles Road; Sarpy County	705				
WP-4	204th Street and Schram Road; Gretna	670				
Totals:			\$27.1	\$9.5	\$36.6	

Notes:

[1] No bonding proceeds were used to fund projects.

[2] Other includes reimbursement for project enhancements by city or county and local and/or state grant funding.

- In January 2017, the P-MRNRD Board of Directors voted to seek engineering consultants to begin preliminary design and environmental permitting on 6 dams located within or in close proximity to development. Studies were to be prepared for Dam Sites Nos. 7, 12 and 19 and WP-1, WP-2, and WP-4. These sites are located in both Douglas and Sarpy counties.

## 5.2 Watershed Management Plan Map Update

### 5.2.1 Overview of Retained Features

The updated long-term Watershed Management Plan map for full platting build-out conditions is depicted in Figure 4. There are 9 regional detention basin and 7 water quality basin projects remaining. Existing regional detention basins are shown under different color coding.

## 5.3 Updated Population and Land Use Projections

Updated land use maps were acquired to help explain the spatial allocations among various types of existing and future development. Land use designations and estimated rates of land consumption for new development are important considerations for the timing and capital costs associated with future regional detention basins and water quality basins. HDR obtained the 2018 Land Use Map and Future Land Map for full platting build-out within the Watershed and the recent 2018 aerial photography for Douglas and Sarpy Counties. Land use categories were combined and aggregated with similar categories to create general land use maps. The 2018 and Future Land Use maps are included in Appendix A.

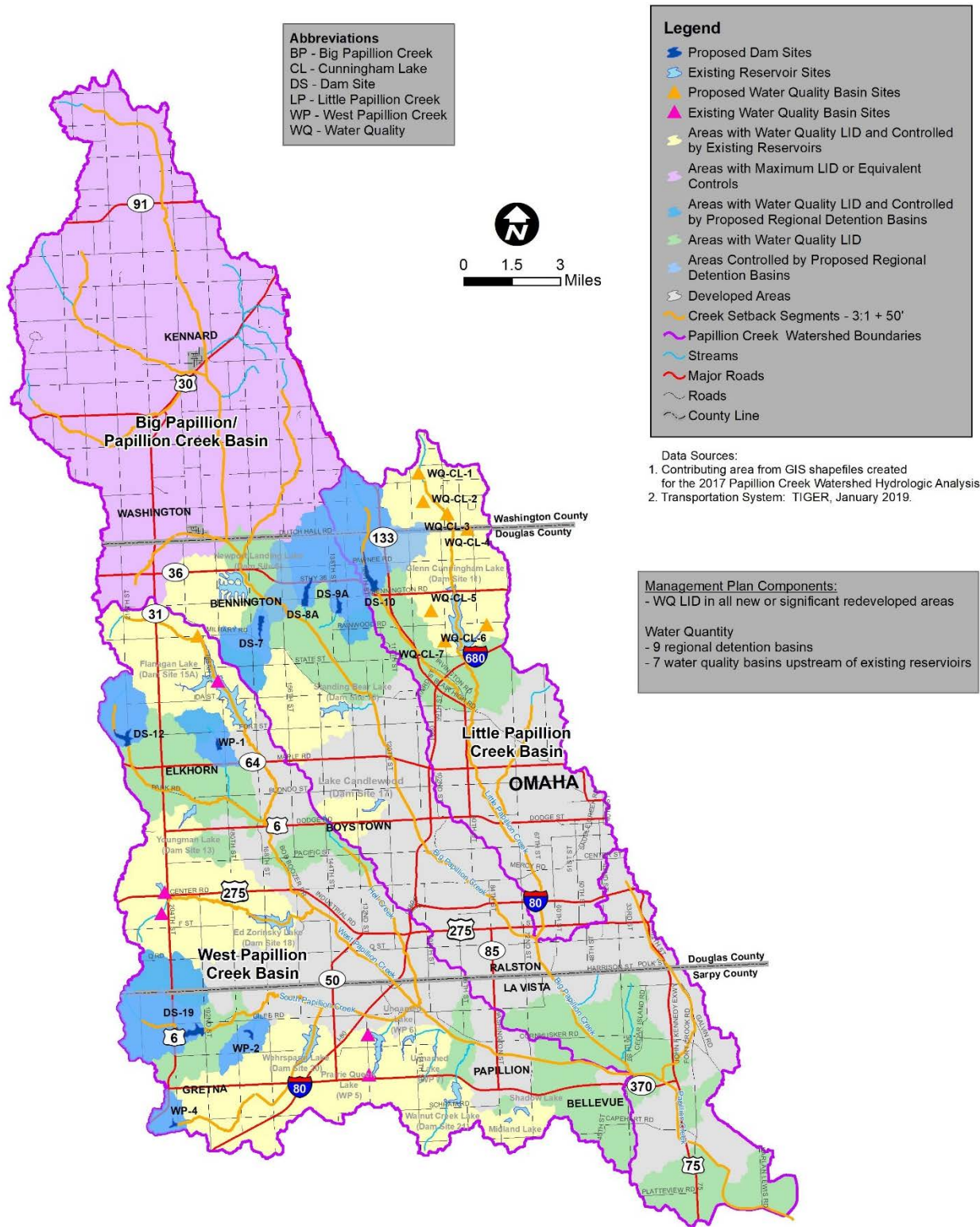
Population projections for the 2019 Update were provided by the Omaha-Council Bluffs Metropolitan Area Planning Agency (MAPA). MAPA's 2050 modeling output was used to spatially allocate population and various types of development within the Papillion Creek Watershed. MAPA 2050 modeling assumptions and data outputs provided the basis for incremental land use consumption and population within occupied housing units. Appendix A contains the basic modeling, mapping, and subsequent calculation procedures used to adapt the 2050 MAPA model for the purpose of this 2019 Update. It was necessary to consolidate the applicable land use categories and resultant land consumption data into Single Family Housing Units (SFHUs), Multi-Family Housing Units (MFHUs), and Commercial/Industrial Development in order to be consistent with the Watershed Fee categories and to provide the basis for estimated Watershed Fee revenue streams for subsequent cash flow analyses.

Figure 5 graphically represents the outcome of the MAPA 2050 model. Note that in the upper graph, red dashed-line and data markers represent the population projections used in the 2014 Report as a comparison to the updated projected populations within Douglas and Sarpy Counties. The updated populations are numerically listed adjacent to the blue and green markers. The projected 5-year increases in SFHUs, MF Gross Developable Acres, and Commercial/Industrial Gross Developable Acres are shown in the lower graph. In the lower graph, in 2025 the incremental increase is lower than the proceeding time period, as population in Douglas and Sarpy Counties will begin to migrate over the Papillion Creek ridgeline and into the southern Sarpy County watersheds. The supporting tabular population and land use projections were extracted from a detailed spreadsheet and are included in Appendix A.

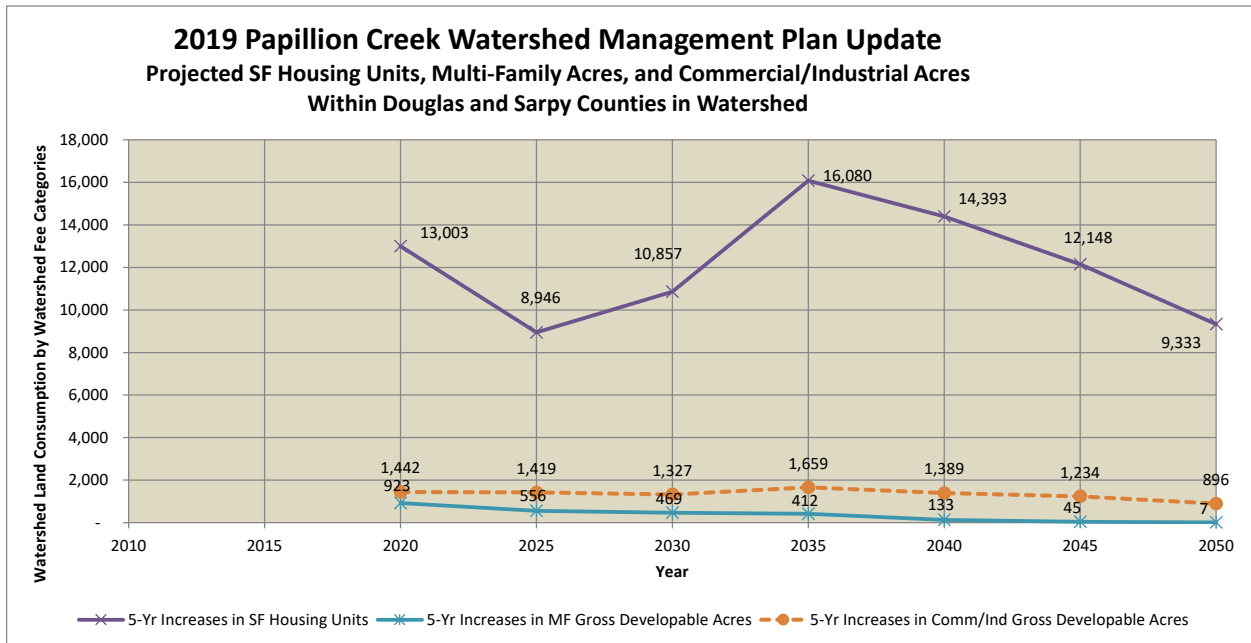
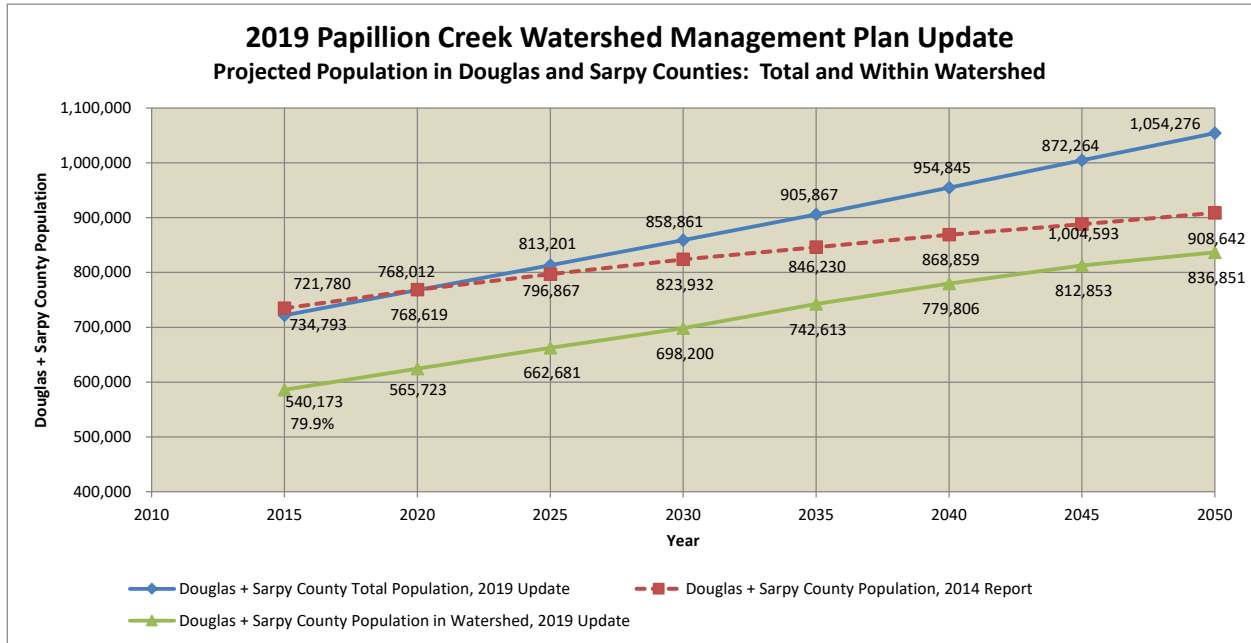


# 2019 Watershed Management Plan Update

Figure 4 2019 Watershed Management Plan Update for Full Build-Out Conditions



**Figure 5 Updated Population and Land Use Projections**



## 5.4 Financial Requirements

### 5.4.1 Previous Program Projects Financial Approach

As shown in Table 3, Program Projects identified for the previous FY 2015 to FY 2019 planning period were constructed with bond proceeds, General Fund allocations, and Watershed Fees as follows:

- The P-MRNRD obtained bonding authority from the Nebraska Legislature in 2009. Bonding authority sunsets in 2019. P-MRNRD has been working with the Legislature to extend the bonding authority to provide scheduling flexibility in constructing Program Projects.
- Three bonds have been issued totaling \$71.5 million. Seventy five percent of the bond proceeds have been used to construct the 2011-2013 Program Projects. Bond repayment is for a 20-year period with an approximate average interest rate of 3 percent. Bond repayments are approximately \$5 million per year and will progressively expire in 2031, 2033, and 2034.
- Watershed Fees are collected by PCWP members through subdivision agreements at the time building permits are secured.

### 5.4.2 Estimated 2019 Update Structural Project Capital Costs

Table 3 summarizes the estimated capital costs for the remaining regional detention basins and water quality basins. Appendix A contains some additional cost breakdown details. The structural projects in Table 3 are listed in preferred sequence, beginning with the WP-1 regional detention basin and ending with the WQ-CL-1 water quality basin. The project sequences listed are based on several general factors:

- A need to provide the most performance-effective flood protection as early as possible in the overall program. Selected projects for the next planning period of FY 2020 to FY 2024 are to be designated as “Program Projects.”
- Estimated population and land consumption trends provide the basic guidance for project timing as to when development platting may subsequently encroach on the structures in question. Related factors include the probable “lead time” that is needed for land appraisals and land acquisition, engineering design time, permitting, and the time it takes to resolve various public utilities and other infrastructure conflicts.
- Balancing project costs over time to the extent practical must be the primary driver for affordability and overall project timing for implementation, deferral, or elimination. There may also be future opportunities for public-private partnerships to help make projects more viable.
- Completing or at least initiating all affordable projects in Douglas and Sarpy Counties prior to platting build-out within respective subbasins is highly desirable from both a cost and timely performance standpoint. Full platting build-out for the entire Watershed within Douglas County may occur by 2050 or slightly beyond, according to previous land consumption estimates and comments from the Omaha Planning Department. Similarly, full platting build-out within the Sarpy County portion of the Watershed has estimated to occur by 2050 due a recognized trend for a more rapid rate of growth.

**Table 3 Summary of Estimated Capital Costs for Remaining Projects**

Structure Name	Stream Reach	Approx. Location/Jurisdiction	Drainage Area (acres)	Est. Normal Pool Area (Acres)	Est. Project Costs, 2018 Basis (Millions of \$) <sup>1</sup>		
					Construction Cost <sup>2</sup>	Real Estate Costs	Total Est. Project Capital Cost
WP-1	Trib. to West Papillion Creek	180 <sup>th</sup> & Fort St.	865	20	\$8.2	\$5.3	\$13.5
WP-4	Trib. to South Papillion	204 <sup>th</sup> & Schram Road	670	15	\$7.2	\$4.9	\$12.1
WP-2	Trib. to South Papillion Creek	180 <sup>th</sup> & Giles Road	705	17	\$5.4	\$4.1	\$9.5
DS 19	South Papillion Creek	192nd & Giles Road	2,750	74	\$12.0	\$16.6	\$28.6
DS 12	West Papillion Creek	216th & Fort Streets	1,660	43	\$11.7	\$13.3	\$25.0
DS 7	Trib to Big Papillion Creek	168th & Bennington Road	1,675	43	\$10.1	\$9.1	\$19.2
DS 8A	Trib to Big Papillion Creek	144th St & Bennington Road	1,850	75	\$7.3	\$9.2	\$16.5
DS 9A	Trib to Big Papillion Creek	132nd & Bennington Road	1,280	38	\$5.4	\$5.8	\$11.2
DS 10	Thomas Creek	120th & Bennington road	2,950	97	\$6.1	\$17.9	\$24.0
<b>Regional Basin Subtotal</b>					<b>\$73.4</b>	<b>\$86.2</b>	<b>\$159.6</b>
WQ-CL-6	Upstr. Cunningham Lake	Omaha	510		\$4.1	\$5.9	\$10.0
WQ-CL-5	Upstr. Cunningham Lake	Omaha	470		\$4.0	\$5.7	\$9.7
WQ-CL-7	Upstr. Cunningham Lake	Omaha	200		\$3.1	\$4.4	\$7.4
WQ-CL-4	Upstr. Cunningham Lake	Omaha & Washington Co.	915		\$6.2	\$8.8	\$15.0
WQ-CL-2	Upstr. Cunningham Lake	Washington Co.	845		\$6.0	\$8.5	\$14.5
WQ-CL-3	Upstr. Cunningham Lake	Washington Co.	790		\$5.8	\$8.2	\$14.0
WQ-CL-1	Upstr. Cunningham Lake	Washington Co.	740		\$5.8	\$8.2	\$14.0
<b>Water Quality Basin Subtotal</b>					<b>\$35.0</b>	<b>\$49.7</b>	<b>\$84.7</b>
<b>Total Regional Detention and Water Quality Basins Total</b>					<b>\$108.4</b>	<b>\$135.9</b>	<b>\$244.3</b>

Notes:

[1] Does not include inflation, total program costs are escalated to year of expenditure in cash flow analysis.

[2] Construction costs include dam construction, utilities/infrastructure relocation/replacement, recreation construction, permitting and engineering.

### 5.4.3 Cash Flow Requirements

A cash flow model was developed to evaluate possible impact of various financing strategies within the P-MRNRD's budget on the implementation of the Papillion Creek Watershed Management Plan. The cash flow model tracks sources of funds (revenues) and uses of funds (expenditures) over a 30-year planning horizon, beginning in 2020. Based on total revenues and expenditures following their historical trends, the model annually estimates the level of funds available for implementing the projects in their desired sequence. The available funds are assumed to be kept in a reserve or sinking fund until its balance is sufficient to fund the next upcoming project in the implementation plan. At the time of implementation, the fund is temporarily depleted and reserves must again build-up until the subsequent project can be constructed. A similar revenue accrual and expenditure pattern must continue until all of the projects in the Management Plan are constructed. Furthermore, a bond issue allows for immediate funding of projects but imposes a long-term debt service requirement.

The model development included four steps:

1. The development of model structure and logic.
2. Development of key model assumptions or inputs.
3. Identification of funding mechanisms.
4. Development of funding scenarios.

The model structure and logic follows straightforward sources and uses of funds analysis. Model assumptions were developed for critical inputs such as: project implementation schedule, regional growth rates, inflation rates, property tax rates (mill levy), Watershed Fees, and bond decisions. These inputs were linked to two funding mechanisms: pay-as-you-go (P-A-Y-G); or bonding with P-A-Y-G. The model assumes two funding mechanisms were then combined to evaluate a combination of funding scenarios. The model development is described in more detail below.

The funding goal for capital projects has been approximately 2/3 from public funding and 1/3 from private funding. This funding goal is commensurate with Policy Group #6: Stormwater Management Financing, included in Appendix B. Public funding is from the P-MRNRD and is based on an assumed allocation of General Funds as described in the P-MRNRD's Long Range Implementation Plan (LRIP). Private funding is generated by Watershed Fees paid by home builders or developers.

### 5.4.4 Sources of Funds

Sources of funds include reserve balances carried over from a previous year, P-MRNRD allocations of General Fund revenues, Watershed Fees, and bond proceeds.

### 5.4.5 Uses of Funds

Uses of funds in the model include expenditures for the implementation of projects and payments to debt service in bonding scenarios.

### 5.4.6 Key Model Assumptions or Inputs

Critical inputs, or assumptions, needed to evaluate the alternatives in the cash flow model include:

1. Desired Sequence of Project Implementation. The sequence used in this analysis is based on current and projected development patterns in the Watershed, anticipated funding availability, and deferral of the water quality basins.
2. Mill Levy. The existing levy of \$0.037594 per \$100 of valuation is used. This represents a plausible estimate for the General Fund revenues which could be allocated based on Nebraska Statutes for the Natural Resources District.
3. Regional Growth. It was assumed that population in the Papillion Creek Watershed would increase based on projections derived from the MAPA 2050 Model. Property values in the Watershed were assumed to increase at a rate of 1.5 percent per year based on D.A. Davidson & Company (P-MRNRD's bonding company) projections for assessed valuations for property in the P-MRNRD's jurisdictional boundary.
4. Inflation Rate. Price levels for the P-MRNRD's existing and planned operation and maintenance expenditures are assumed to increase 2 percent per year based on a long-run average of the Consumer Price Index.
5. Watershed Fees. Watershed Fees were reassessed based on total Program costs (updated remaining structural project costs plus previous Program Projects costs), land use/population projections, and a credit for 1/3 public Watershed Fees collected to date. Funding needs were rebalanced to achieve a 2/3 public and 1/3 private funding goal cost share in conjunction with an inflation index. Reassessed Watershed Fees were then estimated using the multipliers from the 2009 Watershed plan for Single Family residential, High-Density Multi-Family residential and commercial/industrial Fee Categories.
6. Annual Watershed Fee Increases. Watershed Fees are linked to inflation with an assumed long-run average of 2.5 percent over time based on an average of construction cost indices.
7. P-MRNRD Decision to Bond. The P-MRNRD has a remaining authority to issue up to approximately \$26 million in bonds. In scenarios where bonding is used, it assumed that all remaining bonding authority will be used in the next two subsequent planning periods (FY 2020 to FY 2029).
8. Financing Terms for Bonding. It was assumed that bond payments would be the principal amortized over 20 years at 4.5 percent interest, based on a review of previous bonds issued by the P-MRNRD.

## 5.4.7 Funding Mechanisms

The cash flow model considers two (2) funding mechanisms in the range of the modeling scenarios:

1. P-A-Y-G. The first funding mechanism is a continuance of the strategy developed in the 2009 Plan, whereby implementation continues on a P-A-Y-G basis. Under this mechanism the projects are implemented utilizing a combination of General Fund revenue allocations from the P-MRNRD and Watershed Fees. Additional revenues may be gained from some combination of P-MRNRD levy increases or Watershed Fee increases.
2. Bonding with P-A-Y-G. The second funding mechanism adds P-MRNRD bonding authority to the P-A-Y-G. The P-MRNRD has capacity to issue additional bonds with a cap of total annual debt service for all bonds not to exceed 1 percent of the districts total property tax valuation (currently \$26 million in bonding authority). When bonding is used in a scenario, the P-MRNRD would reduce its allocation of funds to the project implementation to cover the costs of bond issuance (annual debt service). Additional revenues may be gained from some combination of P-MRNRD levy increases or Watershed Fee increases.

These funding mechanisms were combined to form 5 financing scenarios described below.

## 5.4.8 Funding Scenarios

An entire suite of funding options is available, given the model assumptions and funding mechanisms described above. The two funding mechanisms were combined with the model assumptions to form financing scenarios described below in Table 4. These financing scenarios represent the range of the financial picture for the project implementation. Scenarios 2A and 2B were evaluated for further consideration, since they have the most similarity to previous funding mechanisms and rates. See Appendix A for additional information on the other scenarios evaluated.

**Table 4 Funding Scenarios Evaluated**

Scenario	Funding Mechanism	Mill Levy per \$100 Valuation	Watershed Fees	P-MRNRD General Fund Allocation
1 Baseline	P-A-Y-G	\$0.037594	Current Rates with Inflation	Dedicated General Fund Allocation per LRIP
2A	Bonding with P-A-Y-G	\$0.037594	Current Rates with Inflation	Same as 1 + Bond Proceeds - Debt Service + Additional \$26M Bond Issuance in FY 2020 (for Land and Construction for Program Projects)
2B	Bonding with P-A-Y-G	\$0.037594	Current Rates with Inflation	Same as 2A, but Additional \$26M Bond Issuance in 2020 (for Land Purchase of Program Projects) with P-A-Y-G for construction funding of Program Projects
3	Bonding with P-A-Y-G	\$0.037594	Current Rates with Inflation	Same as 1 + Bond Proceeds - Debt Service + Additional \$26M Bond Issuance in FY 2020 + \$2M Bond Issuance in FY 2025 (for Land and Construction for Program Projects)
4	Bonding with P-A-Y-G	\$0.037594	Current Rates with Inflation	Same as 3 + Bond Issuance Increased to 2% of P-MRNRD's Valuation (\$52M in FY 2020 + \$2M in 2025)

### 5.4.9 Cash Flow Model Results

Cash flow projections from the model are presented graphically for each funding scenario. Scenarios 2A and 2B have been tentatively selected as the most reasonable funding strategies at this time, and are shown below in Figures 6 and 7, respectively. The figures for the remaining 3 scenarios are included in Appendix A. The figures include revenue streams (annual General Funds from the P-MRNRD, annual Watershed Fees, and cumulative fund balances) and expenditures on projects. From these figures, as well as calculations within the model, key model outputs that were derived include:

1. Number of projects completed in the next implementation (Program Projects) period of FY 2020 to FY 2024.
2. Total number of projects completed in the long-term planning horizon.
3. If all projects were to be completed, the years needed to complete the desired sequence of projects.
4. Impact from assumed inflation on future construction costs.
5. Financing costs for bonding scenarios.

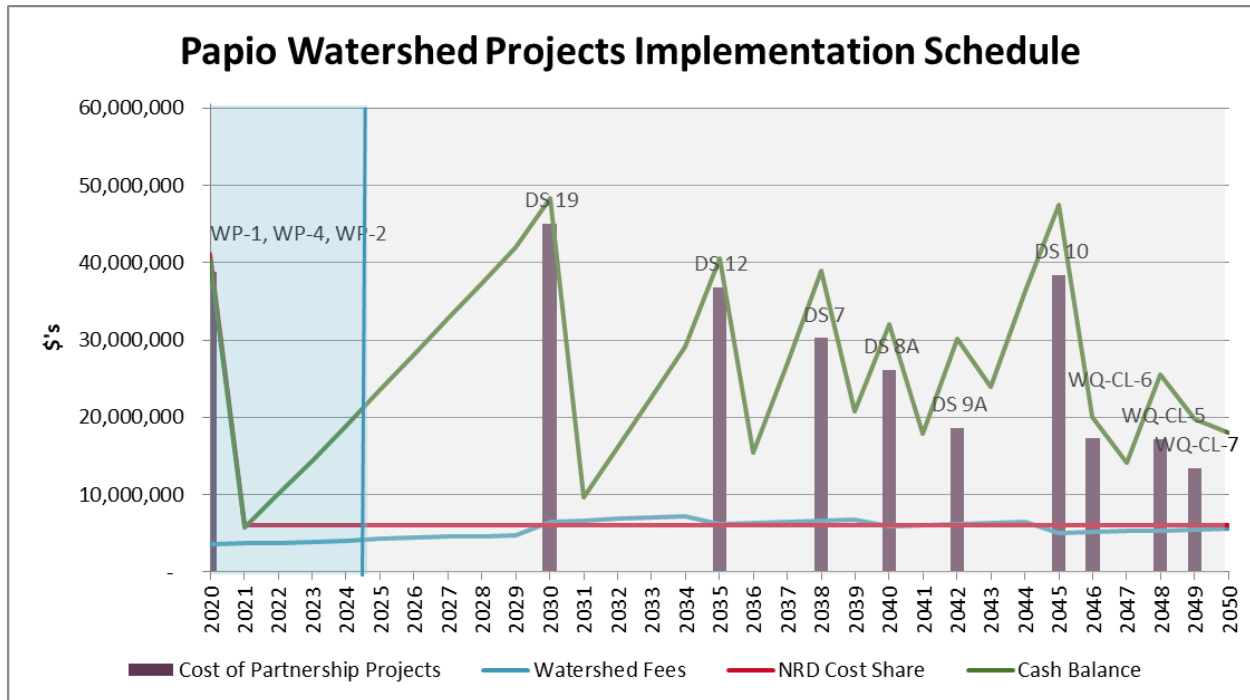
A general description of figure components is summarized below:

- The long-term planning horizon utilized was 30 years (FY 2020 to FY 2050).
- The next Program Projects cycle is shown in light blue from FY 2020 to FY 2024.
- Projects were sequenced based on estimated proximity to urbanization.
- The red line represents the contribution of annual funds from the P-MRNRD's General Fund. In accordance with the LRIP, a dedicated \$6 million dollars is to be set aside for future Watershed projects.
- The blue line represents the annual contribution of Watershed Fees.
- The green solid line represents the cumulative funds available (e.g. annual funds, Watershed Fees, or bonds proceeds).
- The purple bars represent the estimated cost of the project.



# 2019 Watershed Management Plan Update

**Figure 6 Scenario 2A: P-A-Y-G with Existing Mill Levy and Bond \$26 Million to Fund Construction of Program Projects**

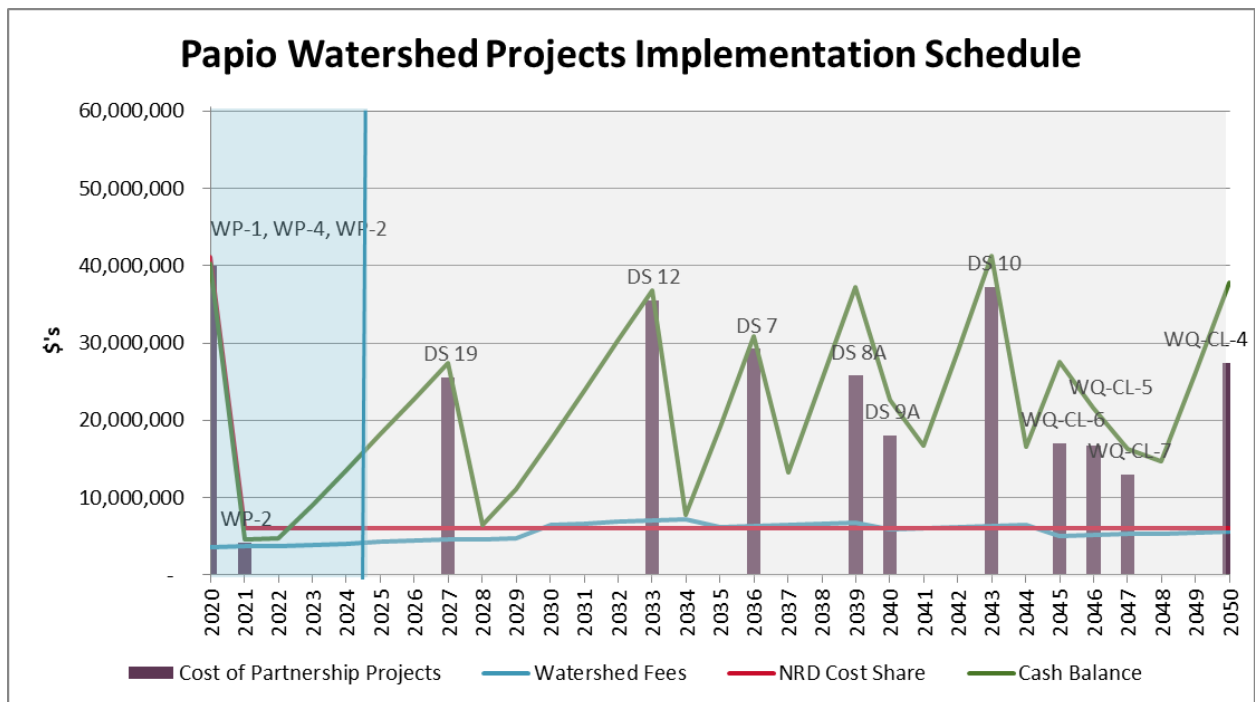


**Results from Figure 6:**

- If the P-MRNRD uses bonding in the next planning period to construct projects, 3 projects will be constructed in the next planning period (FY 2020 to FY 2024).
- All of the 9 remaining regional watershed projects will be completed by 2050.
- Only 3 of the 8 water quality basins can be constructed within the planning horizon.

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**Figure 7 Scenario 2B: P-A-Y-G with Existing Mill Levy and Bond \$26 Million to Fund Construction of Program Projects and Fund Targeted Land Purchases**



**Results from Figure 7:**

- If the P-MRNRD uses bonding between FY 2020 to FY 2024 planning period to acquire land, 3 of the regional basins can be constructed.
- The P-MRNRD could begin acquiring some land at Dam Site 19 moving its implementation date into the next planning period (FY 2025 to FY 2029).
- All of the 9 remaining regional watershed projects will be completed by 2050.
- With the use of bonding to acquire land, 4 of the 8 water quality basins can be constructed within the planning horizon.

**5.4.10 Cash Flow Model Findings**

Table 5 summarizes the total number of projects that could be potentially completed in the 30-year planning horizon and the number of projects that could be completed in the next Program Project cycle from FY 2020 to FY 2024 using Scenario 2A and 2B funding strategies. For these strategies, the existing mill levy of \$0.037594 per \$100 of valuation and the current watershed fees increased with inflation was assumed.

# 2019 Watershed Management Plan Update

**Table 5 Summary of Projects Implemented for Scenarios 2A and 2B**

Scenario	Total Number of Projects Completed in 2050 Planning Horizon	Program Projects Completed FY 2020 to FY 2024
2A Bonding with P-A-Y-G	12	3
2B Bonding with P-A-Y-G	13	3

An overall summary for Scenario 2A and 2B under the current authority of the P-MRNRD:

- Three projects can be implemented within the next planning period with bonding.
- Using bonding to purchase the land at the next sites instead of construction, there would be a small bump in the implementation of future projects beyond the next planning period. Dam Site 19 could be implemented in the FY 2025 to FY 2029 planning period since some of its land could be acquired with bonding.

### 5.4.11 Sensitivity Analysis

A sensitivity analysis was performed on Scenario 2A to test the influence of the primary assumptions on the base set of results. Table 6 presents the selected variables evaluated, the base value used in the scenario, the change in the value, and the number of Program Projects that can be completed. For example, the results indicate that if the inflation is higher or if the land inflation is lower, one more project can be completed.

**Table 6 Sensitivity Analysis for Scenario 2A**

Variable	Base Value	Change in Value	Total Number of Projects Completed in 2050 Planning Horizon	Program Projects Completed FY 2020 to FY 2024
Base Scenario 2A			12	3
Inflation Rate	2.5%	+0.5%	13	3
	2.5%	-0.5%	12	3
Land Inflation Costs	1.5%	+0.5%	12	3
	1.5%	-0.5%	13	3
Bond Interest Rate	4.5%	-0.5%	12	3

## 6.0 Implementation Plan

### 6.1 Overview

The Implementation Plan in the 2009 Report primarily dealt with the administrative and financial requirements necessary to initiate the Watershed Management Plan. Since the basic administrative framework (policies) are already in place, the Implementation Plan within this 2019 Update is primarily intended to provide updated capital cost estimates and recommended Program Projects that can be considered for the upcoming FY 2020 to FY 2024 time frame in accordance with the following provisions:

- Watershed Management Fees (also called “Watershed Fees”) and public funding (the P-MRNRD’s mill levy) are the two revenue streams to be used for the construction of regional detention basin and water quality basin projects called for in the Papillion Creek Watershed Management Plan. The goal for funding the capital projects as a whole has been approximately 2/3 from public funding and 1/3 from Watershed Fees.
- Current Developer Fee classifications are as follows:
  - Single Family (SF) Residential. Fees are assessed per lot. This classification includes low-density multi-family units up to 4-plexes and provides the baseline assumption for stormwater surface runoff potential in comparison to the other fee classifications. Therefore, Single Family Residential has a Surface Runoff Multiplier of 1.0. Typical lot densities range from approximately 3 to 3.5 dwelling units per Gross Developable Acre<sup>3</sup>.
  - High-Density Multi-Family (MF) Residential (beyond 4-plexes). Fees are assessed per Gross Developable Acre, and this classification has an assumed Surface Runoff Multiplier of 1.25 because of increased impervious areas.
  - Commercial/Industrial. Fees are assessed per Gross Developable Acre, and this classification has an assumed Surface Runoff Multiplier of 1.5 because of further increased impervious areas.
- Watershed Fees only apply to new development or significant redevelopment (as defined).
- Watershed Fees are to be collected at time of building permit issuance.
- Watershed Fees (private) are intended to account for approximately one-third (1/3) of required capital funds and shall be paid to the applicable local zoning jurisdiction with building permit applications.
- Watershed Fees collected by PCWP members are transferred to a special Watershed Management Fund that is managed by the P-MRNRD. The P-MRNRD serves as the administrative agent for the PCWP as a public agency having inter-jurisdictional authority. The P-MRNRD has the capability for carrying out the

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<sup>3</sup> Gross Developable Acres means the total interior area within the boundaries of an S&ID that is considered developable. As such, the area occupied by interior streets is included but not the exterior arterials. Also not included are interior areas involving creeks and their development set-back areas; dedicated recreational park or nature preservation areas; existing dedicated wetlands areas that are to remain; areas having exceptionally steep terrain and heavily forested areas not conducive to development; and any interior existing buildings, outlots, and easements that are intended to remain as is. The typical ratio of Gross Developable Acres to Total Gross Acres ranges from 68% to 75% for SF Residential and MF Residential and 75% to 100% for Commercial/Industrial developments.

# 2019 Watershed Management Plan Update

construction of structural projects, as authorized by inter-local agreements within the PCWP.

- The P-MRNRD continue to seek an extension to its general obligation bonding authority from the Nebraska Legislature to provide necessary construction scheduling flexibility.

The P-MRNRD furnished HDR with the following background financial information that was used to update the financial cash-flow model:

- Bonding summaries prepared by the P-MRNRD’s bonding company, D. A. Davidson & Company, for three outstanding bond issuances that are being used to finance the Program Projects that were identified in the 2009 Plan for the 2011 to 2013 planning period.
- The current design and construction status of these projects. This was previously presented in Table 3.
- The bonding summaries and a bond payment schedule that keys into the June 30<sup>th</sup> end of fiscal years from 2018 through the 2034 retirement of the last bond issued.
- The estimated P-MRNRD mill levy requirements are based on an assumed 1.5 percent annual increase in assessed valuations of property within the District.
- Historical P-MRNRD budget information for FY 2000 to FY 2019.
- Watershed Account of revenues and expenditures from FY 2010 through FY 2018.

The Implementation Plan includes structural and non-structural elements. The structural portion of the Implementation Plan consists of Program Projects whose construction would be initiated in the next immediate planning period (assumed to be FY 2020 to 2024).

## 6.2 Structural Components: Program Projects

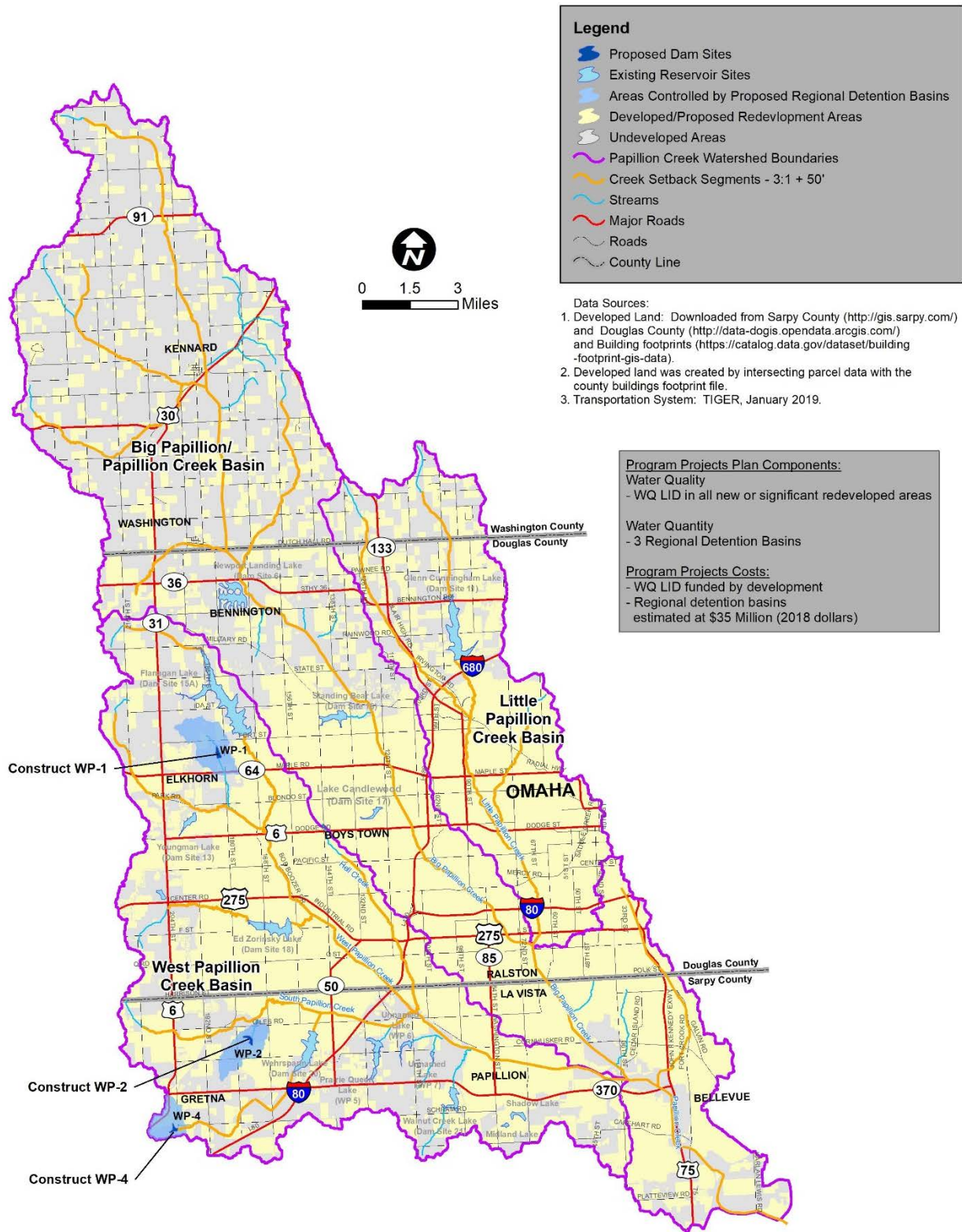
The structural portion of the Implementation Plan Update consists of Program Projects whose construction would be initiated in the next 5-year planning period (FY 2020 to FY 2024). Proposed Program Projects recommended by the PCWP consist of 3 regional detention basins, as listed in Table 7 and shown in Figure 8, which is the Implementation Plan Map.

**Table 7 Watershed Management Plan Program Projects for Years FY 2020 to FY 2024**

Structure	Approx. Location & Planning Jurisdiction	Drainage Area (acres)	Est. Project Capital Costs, 2018 Basis, \$ Millions
WP-1	180th & Fort St., Omaha	865	\$13.5
WP-4	204th & Schram Road, Gretna	670	\$12.1
WP-2	180th & Giles Road, Sarpy County	705	\$9.5
<b>Total</b>			<b>\$35.1</b>

Note: The abbreviation “WP” = West Papillion Creek Watershed.

**Figure 8 Papillion Creek Watershed Implementation Plan (Years FY 2020 to FY 2024)**



## 6.3 Project Funding Framework

Project funding considerations every 5 years need to include a re-examination of financial resources, responsibilities, and constraints that may be needed to better support the Watershed Management Plan and the Implementation Plan.

Every 5 years when the Watershed Management Plan and Implementation Plan are reviewed and updated, Watershed Fees are reassessed based on total Program costs (updated remaining structural projects plus previous Program Projects), land use/population projections, and a credit for Watershed Fees collected to date. Funding needs will be cost shared with the goal of 2/3 public (tax dollars) and 1/3 private (Watershed Fees) for overall Program Project costs. The Watershed Fees will be increased by an annual inflation factor.

Table 8 below summarizes the annual Watershed Fee rate adjustments selected by the PCWP for the Program Project years FY 2020 to FY 2024.

**Table 8      Schedule of Watershed Fees for Years FY 2020 to FY 2024**

Fee Category	Current (FY 2019)	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
Single Family Residential per housing unit or dwelling unit (also includes low-density multi-family up to 4-plexes)	\$908	\$931	\$954	\$978	\$1,002	\$1,027
High-Density Multi-Family Residential (beyond 4-plexes) per gross developable acre	\$3,995	\$4,095	\$4,197	\$4,302	\$4,410	\$4,520
Commercial/Industrial per gross developable acre	\$4,842	\$4,963	\$5,087	\$5,214	\$5,345	\$5,478

Note: The annual increase for FY 2020 to FY 2024 is 2.5 percent per year.

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## List of Appendices

<b><u>Appendix</u></b>	<b><u>Description</u></b>
A	Financial Model Development: Land Use Maps Population, Housing, and Gross Developable Acres Estimates
B	Financial Cash-Flow Model Reference Materials Current Watershed Management Policies

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## Financial Model Development

### Updated Land Use Maps

HDR obtained 2018 Land Use Map<sup>1</sup> and Future Land Map for full platting build-out within the Watershed and the recent 2018 aerial photography for Douglas and Sarpy Counties. The 2018 and Future Land Use maps are included hereinafter in this Appendix A, including the 2050 MAPA modeling output discussed below.

### Updated Population and Land Use Projections

This portion of Appendix A is intended to provide supplemental information concerning the rationale used to derive new population and land use projections. Population and land use projection estimates for Douglas and Sarpy counties were provided by the Omaha-Council Bluffs Metropolitan Area Planning Agency (MAPA). A summary of the process is noted below:

- HDR furnished GIS shape files to MAPA that define the various subbasin boundaries in the Watershed. This allowed MAPA to parse out the portions of these counties that reside within the Watershed. This, in turn, allowed the future landuse allocation output to be spatially applied to new development within the Watershed. This also allowed MAPA to develop projections for population and housing units within the Watershed.
- Population, housing unit information, and percent population growth was provided by MAPA in 5 year increments from 2015 to 2050 within in the Papillion Creek Watershed as defined by the hydrologic subbasin level.
- Overall people per occupied housing units, percent single family and multi-family population per occupied housing unit, occupancy and vacancy rates for single family and multi-family for 2015 and 2050 were provided by MAPA. Five year increments between 2015 and 2050 were calculated by linear interpolation.
- MAPA provided information on developable acreage for single family, multi family, and commercial/industrial land use.
- It was necessary to refine the MAPA outputs for each of the three land use categories as follows:
  - Single Family Housing Units (SFHUs). This housing classification included both occupied and vacant units. Occupied units were based upon the single family occupancy rate for each time increment, as provided by MAPA. One of the complexities for predicting Watershed Fee revenue streams is the inherent time lag from when any given existing or new development parcel was platted to the time when Watershed Fees are collected. Watershed Fees are currently assessed at the time building permits are issued. There is no revenue dependency on whether or not a particular SFHU will soon be occupied or may remain vacant during a particular planning period or beyond. There was no attempt made to reflect future changes in housing demands in response to economic forecasts. The incremental interpolations and extrapolations in SFHUs

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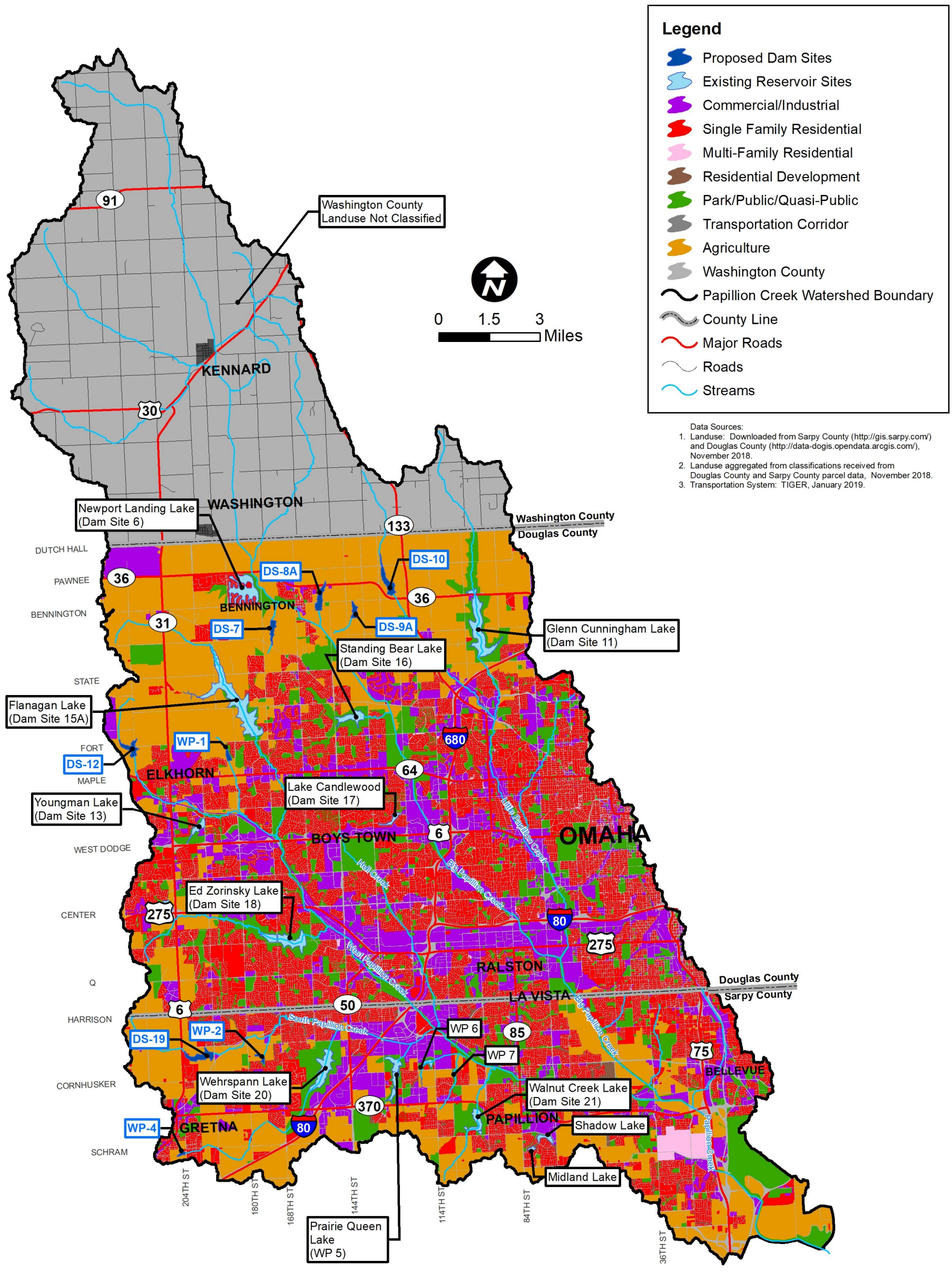
<sup>1</sup> Downloaded from Douglas and Sarpy Counties GIS on-line web services in October 2018.

were based upon growth projection data provided by MAPA for each time increment.

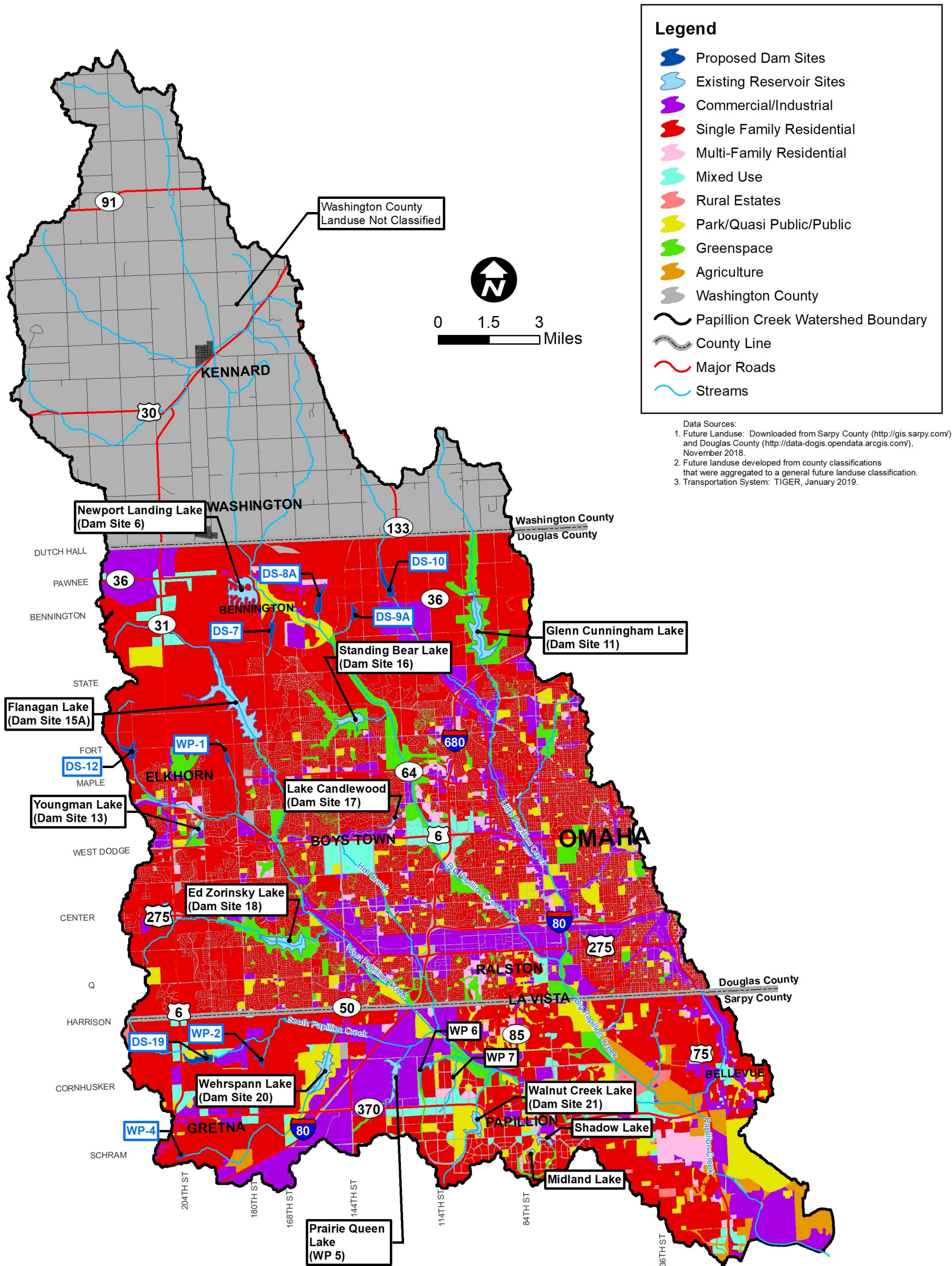
- Multi-Family Housing Units (MFHUs). Considerations are similar to those used for SFHU development; except that Watershed Fees are based on Gross Developable Acres projected land consumption, rather than individual housing units.
- Commercial/Industrial Development. The future landuse outputs included several separate commercial and industrial land use sub-categories. These land uses were consolidated into a single category of Commercial/Industrial Development on a Gross Developable Acre basis to match up with the current Watershed Fee system.
- The modeling outputs were spatially parsed into GIS land use polygons among subbasin boundaries.
- Land use categories were combined and aggregated with similar categories to create general land use maps.

Figure 5 in the Main Body of the 2019 Update graphically represents the outcome of the future land use allocation model adaptation process. The supporting tabular population and land use projections have been extracted from a rather complex calculation spreadsheet and are included as Table A-1.

# Papillion Creek Watershed Landuse 2018



# Papillion Creek Watershed Future Land Use





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**Table A-2 Regional Detention and Water Quality Basin Summary Table**

**2019 Updated Papillion Creek Watershed Management Plan  
Cost Estimates for Regional Detention and Water Quality Basins**

***Regional Detention Basins Summary Table***

Regional Detention Basin	Reach Name	Approx. Location	Drainage Area (acres)	Normal Pool Area (acres)	Construction Cost <sup>1</sup> (\$ million) (2018\$)	Real Estate Cost (\$ million) (2018\$)	Total Estimated Cost (\$million) (2018\$)
WP-1	Trib. to West Papillion Creek	180 <sup>th</sup> & Fort St.	865	20	\$8.2	\$5.3	\$13.5
WP-4	Trib. to South Papillion	204 <sup>th</sup> & Schram Road	670	15	\$7.2	\$4.9	\$12.1
WP-2	Trib. to South Papillion Creek	180 <sup>th</sup> & Giles Road	705	17	\$5.4	\$4.1	\$9.5
DS 19	South Papillion Creek	192nd & Giles Road	2,750	74	\$12.0	\$16.6	\$28.6
DS 12	West Papillion Creek	216th & Fort Streets	1,660	43	\$11.7	\$13.3	\$25.0
DS 7	Trib to Big Papillion Creek	168th & Bennington Road	1,675	43	\$10.1	\$9.1	\$19.2
DS 8A	Trib to Big Papillion Creek	144th St & Bennington Road	1,850	75	\$7.3	\$9.2	\$16.5
DS 9A	Trib to Big Papillion Creek	132nd & Bennington Road	1,280	38	\$5.4	\$5.8	\$11.2
DS 10	Thomas Creek	120th & Bennington road	2,950	97	\$6.1	\$17.9	\$24.0
<b>Subtotals</b>					<b>\$73.3</b>	<b>\$86.1</b>	<b>\$159.6</b>

[1] Construction costs include dam construction, utilities/infrastructure relocation/replacement, recreation construction, permitting and engineering.

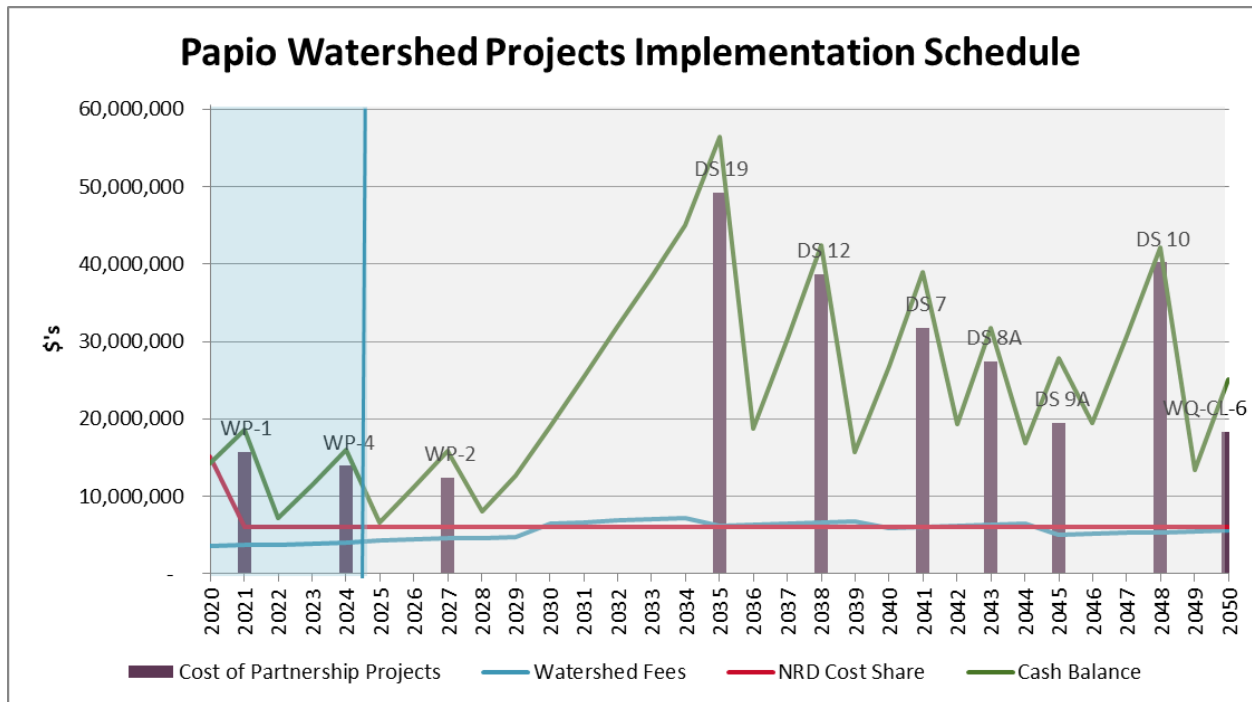
***Water Quality Basin Summary Table***

Water Quality Basin No.	Approx. Location	Drainage Area (acres)	Construction Cost (\$ million) (2018 \$)	Real Estate Cost (\$ million) (2018\$)	Total Estimated Cost (\$million) (2018\$)
WQ- CL-6	Upstream of Cunningham Lake	510	\$4.1	\$5.9	\$10.0
WQ- CL-5	Upstream of Cunningham Lake	470	\$4.0	\$5.7	\$9.7
WQ- CL-7	Upstream of Cunningham Lake	200	\$3.1	\$4.4	\$7.5
WQ- CL-4	Upstream of Cunningham Lake	915	\$6.2	\$8.8	\$15.0
WQ- CL-2	Upstream of Cunningham Lake	845	\$6.0	\$8.5	\$14.5
WQ- CL-3	Upstream of Cunningham Lake	790	\$5.8	\$8.2	\$14.0
WQ- CL-1	Upstream of Cunningham Lake	740	\$5.8	\$8.2	\$14.0
<b>Subtotals</b>			<b>\$35.0</b>	<b>\$49.7</b>	<b>\$84.7</b>

## Remaining Financial Cash-Flow Model Scenarios

A range of funding scenarios was evaluated for project implementation. Provided in this appendix are the results of 3 scenarios: 1, 3 and 4. Key model outputs and a general description of the figures are summarized in the Main Body of the 2019 Update. Scenarios 2A and 2B were selected as the most reasonable funding strategies and are showed in the Main Body of the 2019 Update.

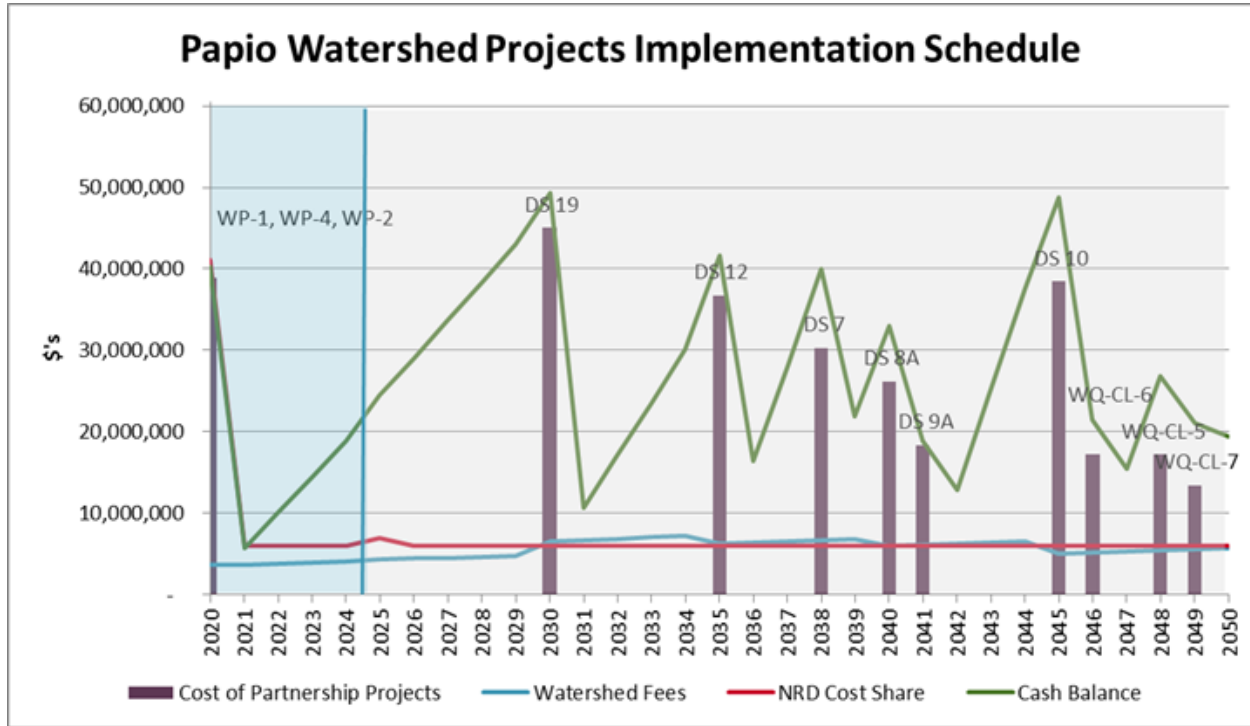
**Figure A-3 Scenario 1: P-A-Y-G with Existing Mill Levy**



**Results from Figure A-3:**

- In the baseline scenario, only 2 projects are constructed in the next Program Project cycle from FY 2020 to FY 2024.
- All 9 of the candidate regional basins and 1 of the water quality basins can be constructed within the planning horizon.

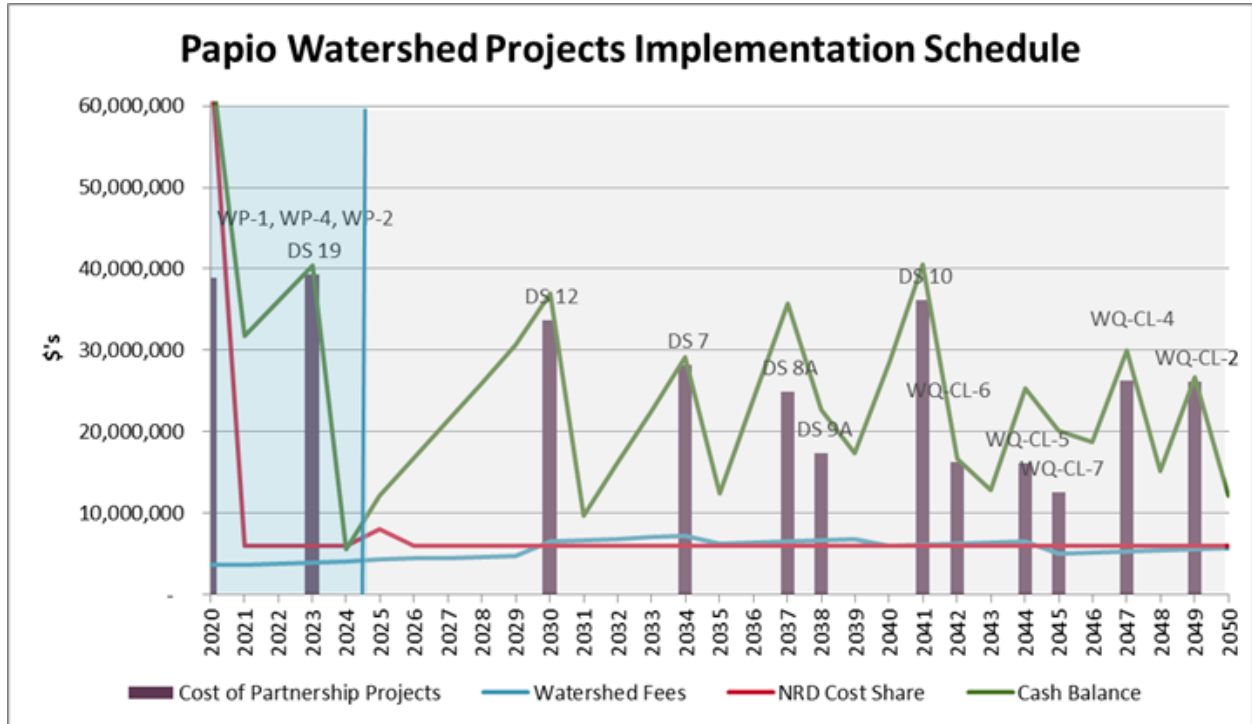
**Figure A-4 Scenario 3: P-A-Y-G with Existing Mill Levy and Bond \$26 Million in 2020 and \$1 Million in 2025 to Fund Construction of Program Projects**



Results from Figure A-4:

- With this scenario, 3 projects are constructed in the next Program Project cycle from FY 2020 to FY 2024.
- All 9 of the candidate regional basins and 3 of the water quality basins can be constructed within the planning horizon.
- The extra \$1 Million in bonding does not increase the number of water quality basins implemented over Scenario 2.

**Figure A-5 Scenario 4: P-A-Y-G with Existing Mill Levy and Bond Issuance to 2% of P-MRNRD's Evaluation (Bond \$52 Million in 2020 and \$2M in 2025) to Fund Construction of Program Projects**



**Results from Figure A-5:**

- With this Scenario 4, 4 projects are constructed in the next Program Project cycle from FY 2020 to FY 2024.
- All 9 of the candidate regional basins and 5 of the water quality basins can be constructed within the planning horizon.

Table A-3 summarizes the total number of projects that could be potentially completed with the 2050 planning horizon and the number of projects that could be completed in the next Program Project cycle from FY2020 to FY2024 for the funding scenarios evaluated.

**Table A-3 Summary of Candidate Projects Implemented for Each Scenario**

<b>P-A-Y-G</b>				
<b>Scenario</b>	<b>Mill Levy per \$100 Valuation</b>	<b>Watershed Fees</b>	<b>Total Number of Program Projects Completed in 30-Year Planning Horizon (Regional Basins/WQ Basins)</b>	<b>Program Projects Completed FY 2020 to FY 2024</b>
1 Baseline	\$ 0.037594	Current Rates with Inflation	10 (All 9/1)	2
<b>Bonding with P-A-Y-G</b>				
<b>Scenario</b>	<b>Mill Levy per \$100 Valuation</b>	<b>Watershed Fees</b>	<b>Total Number of Program Projects Completed Within 2050 Planning Horizon (Regional Basins/WQ Basins)</b>	<b>Program Projects Completed FY2020 to FY2024</b>
2A	\$ 0.037594	Current Rates with Inflation	12 (All 9/3)	3
2B	\$ 0.037594	Current Rates with Inflation	13 (All 9/4)	3
3	\$ 0.037594	Current Rates with Inflation	12 (9/3)	3
4	\$ 0.037594	Current Rates with Inflation	14 (9/5)	4

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## **Current Watershed Management Policies**

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# Exhibit B PAPILLION CREEK WATERSHED STORMWATER MANAGEMENT POLICIES

## POLICY GROUP #1: WATER QUALITY IMPROVEMENT

**ISSUE:** Waters of the Papillion Creek Watershed are impaired.

**“ROOT” POLICY:** Improve water quality from all contributing sources, including but not limited to, agricultural activities, urban stormwater, and combined sewer overflows, such that waters of the Papillion Creek Watershed and other local watersheds can meet applicable water quality standards and community-based goals, where feasible.

### **SUB-POLICIES:**

- 1) Water Quality LID shall be required on all new developments and significant redevelopments.
- 2) Protect surface and groundwater resources from soil erosion (sheet and rill, wind erosion, gully and stream bank erosion), sedimentation, nutrient and chemical contamination. Buffer strips and riparian corridors should be established along all stream segments.
- 3) Preserve and protect wetland areas to the fullest extent possible to maintain natural hydrology and improve water quality by minimizing the downstream transport of sediment, nutrients, bacteria, etc. borne by surface water runoff. Reestablishment of previously existing wetlands and the creation of new wetlands should be promoted. Any impacted wetlands shall be mitigated at a 3:1 ratio.
- 4) Implement MS4 Stormwater Management Plan to address TMDL.
- 5) Implement Best Management Practices (BMPs), as identified in the Papio-Missouri River Basin Water Quality Management Plan (WQMP), to reduce both urban and rural pollution sources, maintain or restore designated beneficial uses of streams and surface water impoundments, minimize soil loss, and provide sustainable production levels. Water quality basins shall be located in general conformance with an adopted Papillion Creek Watershed Management Plan.

### **REFERENCE INFORMATION**

#### **DEFINITIONS:**

- 1) Low-Impact Development (LID). A land development and management approach whereby stormwater runoff is managed using design techniques that promote infiltration, filtration, storage, evaporation, and temporary detention close to its source. Management of such stormwater runoff sources may include open space, rooftops, streetscapes, parking lots, sidewalks, medians, etc.
- 2) Water Quality LID. A level of LID using strategies designed to provide for water quality control of the first ½ inch of stormwater runoff generated from each new development or significant redevelopment and to maintain the peak discharge rates during the 2-year storm event to baseline land use conditions, measured at every drainage (stormwater discharge) outlet from the new development or significant redevelopment.
- 3) Best Management Practice (BMP). “A technique, measure or structural control that is used for a given set of conditions to manage the quantity and improve the quality of

## Exhibit B

# PAPILLION CREEK WATERSHED STORMWATER MANAGEMENT POLICIES

stormwater runoff in the most cost-effective manner.” [Source: U.S. Environmental Protection Agency (EPA)]

- 4) Total Maximum Daily Load (TMDL). A calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources. TMDLs have been approved by EPA for Zorinsky Lake and Papillion Creek Watershed. A September 2002 TMDL addresses Zorinsky Lake for parameters of concern: siltation, nutrients and organic enrichment/low dissolved oxygen. TMDL for Papillion Creek Watershed was approved in October 2009 for *E. coil* bacteria for the segments identified in Table 1.

Table 1. Papillion Creek Watershed Segments of Impaired Waterbodies.

Segment	Stream Segment Location
MT1-10100	Papillion Creek – Big Papillion Creek confluence with West Papillion Creek to Missouri River
MT1-10110	Big Papillion Creek - Little Papillion Creek to confluence with West Papillion Creek
MT1-10111	Little Papillion Creek - Thomas Creek to confluence with Big Papillion Creek
MT1-10111.1	Cole Creek
MT1-10120	Big Papillion Creek - Butter Flat Creek to confluence with Little Papillion Creek
MT1-10200	West Papillion Creek - South Papillion Creek to Confluence with Big Papillion Creek

Water quality standards are set by States, Territories, and Tribes. They identify the uses for each waterbody, for example, drinking water supply, contact recreation (swimming), and aquatic life support (fishing), and the scientific criteria to support that use. A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and non-point sources. The calculation must include a margin of safety to ensure that the waterbody can be used for the purposes the State has designated. The calculation must also account for seasonal variation in water quality. The Clean Water Act, Section 303, establishes the water quality standards and TMDL programs, and for Nebraska such standards and programs are administered by the Nebraska Department of Environmental Quality. [Source: EPA and Nebraska Surface Water Quality Standards, Title 117].

- 5) Municipal Separate Storm Sewer System (MS4). An MS4 is a conveyance or system of conveyances that is:
- owned by a state, city, town, village, or other public entity that discharges to waters of the U.S.,
  - designed or used to collect or convey stormwater (e.g., storm drains, pipes, ditches),
  - not a combined sewer, and
  - not part of a sewage treatment plant, or publicly owned treatment works (POTW).
- [Source: EPA].

The communities located with the urbanized area of Douglas and Sarpy counties, as defined by EPA, are defined as an MS4s.

**Exhibit B**  
**PAPILLION CREEK WATERSHED**  
**STORMWATER MANAGEMENT POLICIES**

- 6) Stormwater Management Plan (SWMP). EPA's National Pollutant Discharge System (NPDES) requires small, medium, and large communities to obtain NPDES permits and develop stormwater management programs. The communities located within the Papillion Creek Watershed have developed a Stormwater Management Plan (SWMP) that describes stormwater control practices that will be implemented consistent with permit requirements to minimize the discharge of pollutants from the sewer system. MS4s are required to develop, implement, and enforce a stormwater management program. The SWMP focus is to describe how the MS4 will reduce the discharge of pollutants from its sewer system and addresses these program areas:
- Construction Site Runoff Control
  - Illicit Discharge Detection and Elimination
  - Pollution Prevention/Good Housekeeping
  - Post-Construction Runoff Control
  - Public Education and Outreach
  - Public Involvement/Participation
- 7) Water Quality Management Plan (WQMP). Plan based on EPA's nine key elements (9 Elements) requirements to achieve improvements in water quality. A WQMP for the Papio-Missouri River Basin, which includes the Papillion Creek Watershed, was approved in June 2018 by EPA which lays out a strategy to systematically address water resource deficiencies in the basin and allows for management of individual watersheds or other targeted areas. The focus of the Plan is to address impaired waterbodies and satisfy the EPA requirements to be eligible for Section 319 funding. Implementation will be guided on a watershed scale by a comprehensive strategy to address water and land use deficiencies that contribute to the degradation of surface water resources, groundwater resources, and aquatic and terrestrial habitat. The ultimate goals is to delist impaired waterbodies from the 303(d) list. *[Source: 2018 Papio-Missouri River Basin Water Quality Management Plan]*.

# Exhibit B PAPILLION CREEK WATERSHED STORMWATER MANAGEMENT POLICIES

## POLICY GROUP #2: PEAK FLOW REDUCTION

### ISSUE

Urbanization within the Papillion Creek Watershed has and will continue to increase runoff leading to more flooding problems and diminished water quality.

### ROOT POLICY

Maintain or reduce stormwater peak discharge during development and after full build-out land use conditions from that which existed under baseline land use conditions.

### SUB-POLICY

- 1) Regional stormwater detention facilities and other structural and non-structural BMPs shall be located in general conformance with an adopted Papillion Creek Watershed Management Plan and shall be coordinated with other related master planning efforts for parks, streets, water, sewer, etc.
- 2) Maximum LID shall be required to reduce peak discharge rates on all new developments and significant redevelopments as identified in the Papillion Creek Watershed Management Plan.
- 3) All significant redevelopment shall maintain peak discharge rates during the 2, 10, and 100-year storm event under baseline land use conditions.

### REFERENCE INFORMATION

### DEFINITIONS

- 1) Low-Impact Development (LID). A land development and management approach whereby stormwater runoff is managed using design techniques that promote infiltration, filtration, storage, evaporation, and temporary detention close to its source. Management of such stormwater runoff sources may include open space, rooftops, streetscapes, parking lots, sidewalks, medians, etc.
- 2) Water Quality LID. A level of LID using strategies designed to provide for water quality control of the first ½ inch of stormwater runoff generated from each new development or significant redevelopment and to maintain the peak discharge rates during the 2-year storm event to baseline land use condition, measured at every drainage (stormwater discharge) outlet from the new development or significant redevelopment.
- 3) Maximum LID. A level of LID using strategies, including water quality LID and on-site detention, designed not to exceed peak discharge rates of more than 0.2 cfs/acre during the 2-year storm event or 0.5 cfs/acre during the 100-year storm event based on the contributing drainage from each site, measured at every drainage (stormwater discharge) outlet from the new development or significant redevelopment.
- 4) Peak Discharge or Peak Flow. The maximum instantaneous surface water discharge rate resulting from a design storm frequency event for a particular hydrologic and hydraulic analysis, as defined in the Omaha Regional Stormwater Design Manual. The measurement of the peak discharge shall be at the lower-most drainage outlet(s) from a new development or significant redevelopment.

**Exhibit B**  
**PAPILLION CREEK WATERSHED**  
**STORMWATER MANAGEMENT POLICIES**

- 5) Regional Stormwater Detention Facilities. Those facilities generally serving a drainage catchment area of 500 acres or more in size.
- 6) Baseline Land Use Conditions. That which existed for Year 2001 for Big and Little Papillion Creeks and its tributaries (excluding West Papillion Creek) and for Year 2004 for West Papillion Creek and its tributaries.
- 7) Full Build-Out Land Use Conditions. Fully platted developable land use conditions for the combined portions of the Papillion Creek Watershed that lie in Douglas and Sarpy Counties that are assumed to occur by the Year 2050, plus the projected 2050 land uses within the Watershed in Washington County; or as may be redefined through periodic updates to the respective County comprehensive plans.

## **Exhibit B**

# **PAPILLION CREEK WATERSHED STORMWATER MANAGEMENT POLICIES**

### **POLICY GROUP #3: LANDSCAPE PRESERVATION, RESTORATION, AND CONSERVATION**

**ISSUE:** Natural areas are diminishing, and there is a need to be proactive and integrate efforts directed toward providing additional landscape and green space areas with enhanced stormwater management through restoration and conservation of stream corridors, wetlands, and other natural vegetation.

**“ROOT” POLICY:** Utilize landscape preservation, restoration, and conservation techniques to meet the multi-purpose objectives of enhanced aesthetics, quality of life, recreational and educational opportunities, pollutant reduction, and overall stormwater management.

#### **SUB-POLICIES:**

- 1) Incorporate stormwater management strategies as a part of landscape preservation, restoration, and conservation efforts where technically feasible.
- 2) Define natural resources for the purpose of preservation, restoration, mitigation, and/or enhancement.
- 3) For new development or significant redevelopment, provide a creek setback of 3:1 plus 50 feet along all streams as identified in the Papillion Creek Watershed Management Plan and a creek setback of 3:1 plus 20 feet for all other watercourses.
- 4) All landscape preservation features as required in this policy or other policies, including all stormwater and LID strategies, creek setbacks, existing or mitigated wetlands, etc., identified in new or significant redevelopment shall be placed into an out lot or within public right of way or otherwise approved easement.
- 5) These policies are intended to provide a minimum requirement for new development or significant redevelopment. Site conditions may warrant additional setback distance or other stream stabilization measures.
- 6) The Papillion Creek Watershed Partnership is working in conjunction with USACE to study stream stability in the watershed. Additional policy updates may be considered at the conclusion of that study.

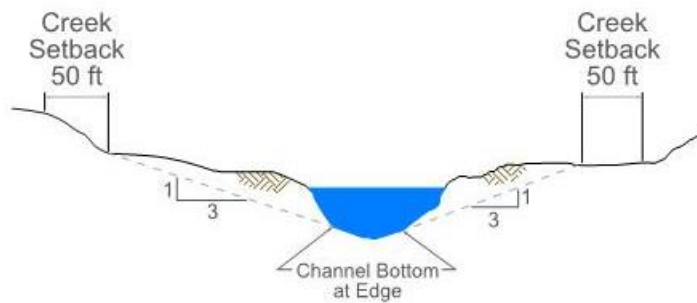
#### **REFERENCE INFORMATION**

#### **DEFINITIONS**

- 1) Creek Setback. See Figure 1 below and related definitions in Policy Group #5. A setback area equal to three (3) times the channel depth plus fifty (50) feet (3:1 plus 50 feet) from the edge of the channel bottom on both sides of the channel shall be required for any above or below ground structure exclusive of bank stabilization structures, poles or sign structures adjacent to any watercourse defined within the watershed drainage plan. Grading, stockpiling, and other construction activities are not allowed within the setback area and the setback area must be protected with adequate erosion controls or other Best Management Practices, (BMPs). The outer 30 feet adjacent to the creek setback limits may be credited toward meeting the landscaping buffer and pervious coverage requirements.

## Exhibit B PAPILLION CREEK WATERSHED STORMWATER MANAGEMENT POLICIES

A property can be exempt from the creek setback requirement upon a showing by a licensed professional engineer that adequate bank stabilization structures or slope protection will be installed in the construction of said structure, having an estimated useful life equal to that of the structure, which will provide adequate erosion control conditions coupled with adequate lateral support so that no portion of said structure adjacent to the stream will be endangered by erosion or lack of lateral support. In the event that the structure is adjacent to any stream which has been channelized or otherwise improved by any agency of government, then such certificate providing an exception to the creek setback requirement may take the form of a certification as to the adequacy and protection of the improvements installed by such governmental agency. If such exemption is granted, applicable rights-of-way must be provided and a minimum 20-foot corridor adjacent thereto.



**Figure 1 –Creek Setback Schematic**

**Exhibit B**  
**PAPILLION CREEK WATERSHED**  
**STORMWATER MANAGEMENT POLICIES**

**POLICY GROUP #4: EROSION AND SEDIMENT CONTROL  
AND OTHER BMPs**

**ISSUE:** Sound erosion and sediment control design and enforcement practices are needed in order to protect valuable land resources, stream and other drainage corridors, and surface water impoundments and for the parallel purpose of meeting applicable Nebraska Department of Environmental Quality regulatory requirements for construction activities that disturb greater than one acre.

**“ROOT” POLICY:** Promote uniform erosion and sediment control measures by implementing consistent rules for regulatory compliance pursuant to State and Federal requirements, including the adoption of the Omaha Regional Stormwater Design Manual.

**SUB-POLICIES:**

- 1) Construction site stormwater management controls shall include both erosion and sediment control measures.
- 2) The design and implementation of post-construction, permanent erosion and sediment controls shall be considered in conjunction with meeting the intent of other Stormwater Management Policies.
- 3) Sediment storage shall be incorporated with all regional detention facilities where technically feasible.

**REFERENCE INFORMATION**

**DEFINITIONS**

- 1) Erosion Control. Land and stormwater management practices that minimize soil loss caused by surface water movement.
- 2) Sediment Control. Land and stormwater management practices that minimize the transport and deposition of sediment onto adjacent properties and into receiving streams and surface water impoundments.



## Exhibit B

# PAPILLION CREEK WATERSHED STORMWATER MANAGEMENT POLICIES

### POLICY GROUP #5: FLOODPLAIN MANAGEMENT

**ISSUE:** Continued and anticipated development within the Papillion Creek Watershed mandates that holistic floodplain management be implemented and maintained in order to protect its citizens, property, and natural resources.

**“ROOT” POLICY:** Participate in the FEMA National Flood Insurance Program, update FEMA floodplain mapping throughout the Papillion Creek Watershed, and enforce floodplain regulations to full build-out, base flood elevations.

#### **SUB-POLICIES:**

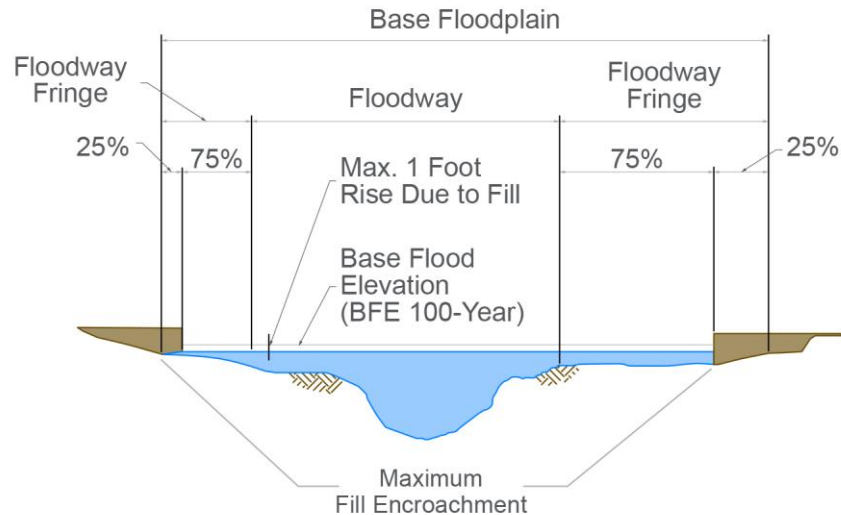
- 1) Floodplain management coordination among all jurisdictions within the Papillion Creek Watershed and the Papio-Missouri River Natural Resources District (P-MRNRD) is required.
- 2) Flood Insurance Studies and Flood Insurance Rate Maps throughout the Papillion Creek Watershed shall be updated as new data and methodologies become available. Any further updates will use current and full-build out conditions hydrology.
- 3) Encroachments for new developments or significant redevelopments within floodway fringes shall not cause any increase greater than one (1.00) foot in the height of the full build-out base flood elevation using best available data.
- 4) Filling of the floodway fringe associated with new development within the Papillion Creek System shall be limited to 25% of the floodway fringe in the floodplain development application project area, unless approved mitigation measures are implemented. The remaining 75% of floodway fringe within the project area shall be designated as a floodway overlay zone. For redevelopment, these provisions may be modified or waived in whole or in part by the local jurisdiction.
- 5) The low chord elevation for bridges crossing all watercourses within FEMA designated floodplains shall be a minimum of one (1) foot above the base flood elevation for full-build out conditions hydrology using best available data.
- 6) The lowest first floor elevation of buildings associated with new development or significant redevelopment that are upstream of and contiguous to regional dams within the Papillion Creek Watershed shall be a minimum of one (1) foot above the 500-year flood pool elevation (i.e. auxiliary spillway crest + 1 foot).

#### **REFERENCE INFORMATION**

**DEFINITIONS** (See Figure 1 below and related definitions in Policy Group #3: Landscape Preservation, Restoration, and Conservation).

- 1) **Base Flood.** The flood having a one percent chance of being equaled or exceeded in magnitude in any given year (commonly called a 100-year flood). *[Adapted from Chapter 31 of Nebraska Statutes]*
- 2) **Floodway.** The channel of a watercourse and the adjacent land areas that are necessary to be reserved in order to discharge the base flood without cumulatively

## Exhibit B PAPILLION CREEK WATERSHED STORMWATER MANAGEMENT POLICIES



**Figure 1 – Floodway Fringe Encroachment Schematic**

increasing the water surface elevation more than one foot. *[Adapted from Chapter 31 of Nebraska Statutes]*. The Federal Emergency Management Agency (FEMA) provides further clarification that a floodway is the central portion of a riverine floodplain needed to carry the deeper, faster moving water.

- 3) Floodway Fringe. That portion of the floodplain of the base flood, which is outside of the floodway. *[Adapted from Chapter 31 of Nebraska Statutes]*
- 4) Floodplain. The area adjoining a watercourse, which has been or may be covered by flood waters. *[Adapted from Chapter 31 of Nebraska Statutes]*
- 5) Watercourse. Any depression two feet or more below the surrounding land which serves to give direction to a current of water at least nine months of the year and which has a bed and well-defined banks. *[Adapted from Chapter 31 of Nebraska Statutes]*
- 6) Low Chord Elevation. The bottom-most face elevation of horizontal support girders or similar superstructure that supports a bridge deck.
- 7) Flood Insurance Studies and Flood Insurance Rate Maps. FEMA and the P-MRNRD as a Cooperating Technical Partner update Flood Insurance Studies and Flood Insurance Rate Maps as new data, methodologies, or funding is available. FEMA and P-MRNRD work together to determine if updates are necessary. As part of any new study, FEMA will produce both the Flood Insurance Study and Flood Insurance Rate Maps, as well as Flood Risk Products. These products include a Flood Risk Map, a Flood Risk Report, and a Flood Risk Database, Changes Since Last FIRM, Areas of Mitigation Interest, Flood Depth and Analysis Grids, and Flood Risk Assessment Data. In addition to these standard datasets, the Flood Risk Database may contain custom datasets based on available information.8) New Development. New development shall be defined as that which is undertaken to any undeveloped parcel that existed at the time of implementation of this policy.

## **Exhibit B**

# **PAPILLION CREEK WATERSHED STORMWATER MANAGEMENT POLICIES**

### **POLICY GROUP #6: STORMWATER MANAGEMENT FINANCING**

**ISSUE:** Regulatory requirements for stormwater management and implementation of Stormwater Management Policies intended to accommodate new development and significant redevelopment will impose large financial demands for capital and operation and maintenance beyond existing funding resources.

**“ROOT” POLICY:** Dedicated, sustainable funding mechanisms shall be developed and implemented to meet capital and operation and maintenance obligations needed to implement NPDES Stormwater Management Plans, Stormwater Management Policies, and the Papillion Creek Watershed Management Plan.

#### **SUB-POLICIES:**

- 1) All new development and significant redevelopment will be required to fund the planning, implementation, and operation and maintenance of water quality LID.
- 2) A Watershed Management Fee system shall be established to equitably distribute the capital cost of implementing the Papillion Creek Watershed Management Plan among new development or significant redevelopment. Such Watershed Management Fee shall only apply to new development or significant redevelopment within the Papillion Creek Watershed and the initial framework shall consist of the following provisions:
  - a. Collection of fees and public funding shall be earmarked specifically for the construction of projects called for in the Papillion Creek Watershed Management Plan, including Maximum LID costs such as on site detention, regional detention basins, and water quality basins.
  - b. Multiple fee classifications shall be established which fairly and equitably distribute the cost of these projects among all undeveloped areas within the Papillion Creek Watershed.
  - c. Watershed Management Fees (private) are intended to account for approximately one-third (1/3) of required capital funds and shall be paid to the applicable local zoning jurisdiction with building permit applications.
  - d. Watershed Management Fee revenues shall be transferred from the applicable local zoning jurisdiction to a special P-MRNRD construction account via inter-local agreements.
  - e. The P-MRNRD (public) costs are intended to account for approximately two-thirds (2/3) of required capital funds, including the cost of obtaining necessary land rights, except as further provided below; and the P-MRNRD shall be responsible for constructing regional detention structures and water quality basins using pooled accumulated funds.
  - f. The P-MRNRD will seek an extension of its general obligation bonding authority from the Nebraska Legislature to provide necessary construction scheduling flexibility.
  - g. Financing for Papillion Creek Watershed Management Plan projects may require public-private partnership agreements between the P-MRNRD and developers/S&IDs on a case-by-case basis.

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- h. On approximately five (5)-year intervals, the Papillion Creek Watershed Management Plan and Watershed Management Fee framework, rates, and construction priority schedule shall be reviewed with respect to availability of needed funds and rate of development within the Papillion Creek Watershed by the parties involved (local zoning jurisdictions, P-MRNRD, and the development community). Subsequent changes thereto shall be formally approved by the respective local zoning jurisdictions and the P-MRNRD.
- 3) A Stormwater Utility Fee System shall be established to equitably distribute the costs for ongoing operation and maintenance of all stormwater BMPs and infrastructure among all existing property owners within MS4 jurisdictions.
- a. MS4 cities and counties should actively seek legislation from the Nebraska Legislature to allow for the establishment of an equitable stormwater utility fee.
  - b. The initial framework for the Stormwater Utility Fee System should consist of the following provisions provided Nebraska statutes allow for such a fee:
    - i. A county or city shall establish by resolution user charges to be assessed against all real property within its zoning jurisdiction and may issue revenue bonds or refunding bonds payable from the proceeds of such charges, all upon terms as the county board or city council determines are reasonable.
    - ii. Such charges shall be designed to be proportionate to the stormwater runoff contributed from such real property and based on sound engineering principles.
    - iii. Such charges should provide credits or adjustments for stormwater quantity and quality BMPs utilized in order to encourage wise conservation and management of stormwater on each property.
    - iv. Such charges shall be collected in a manner that the county or city determines as appropriate and shall not be determined to be special benefit assessments.
    - v. A county or city shall establish a system for exemption from the charges for the property of the state and its governmental subdivisions to the extent that it is being used for a public purpose. The local elected body shall also provide an appeals process for aggrieved parties.
    - vi. A county shall not impose these charges against real property that is being charges user charges by a city.
    - vii. Any funds raised from a Stormwater Utility Fee shall be placed in a separate fund and shall not be used for any purpose other than those specified.

**REFERENCE INFORMATION**

**DEFINITIONS**

- 1) Stormwater Management Policies. Initial stormwater management policies were approved in 2009. The policies were developed by the Technical Workgroup and Policy

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# PAPILLION CREEK WATERSHED STORMWATER MANAGEMENT POLICIES

Workgroup that were commissioned by the Papillion Creek Watershed Partnership (PCWP) subsequent to the “Green, Clean, and Safe” initiatives developed through the “Watershed by Design” public forums conducted in 2004 and 2005 and subsequently revised by the PCWP in 2009, 2014 and 2019. The following policy groups contain “root” policies and sub-policies for stormwater management that have been developed in addition to the Stormwater Management Financing Policy Group herein:

- Policy Group #1 – Water Quality Improvement
  - Policy Group #2 – Peak Flow Reduction
  - Policy Group #3 – Landscape Preservation, Restoration, and Conservation
  - Policy Group #4 – Erosion and Sediment Control and Other BMPs
  - Policy Group #5 – Floodplain Management
- 2) Stormwater Management Plan (SWMP). A SWMP is a required part of the NPDES MS4 Stormwater Permits issued to the Papillion Creek Watershed Partnership (PCWP) members. Development of Stormwater Management Policies is an integral part of the SWMP, and such policies are to be adopted by respective PCWP partners.
  - 3) Comprehensive Development Plans. Existing plans developed by local jurisdictions that serve as the basis for zoning and other land use regulations and ordinances. The Stormwater Management Policies are to be incorporated into the respective Comprehensive Development Plans.
  - 4) Policy Implementation. The implementation of the policies will be through the development of ordinances and regulations, in years 3 through 5 of the NPDES permit cycle; that is, by the year 2019. Ordinances and regulations are intended to be consistent for, and adopted by, the respective PCWP members. Such ordinances and regulations shall need to be consistent with the Comprehensive Development Plans of the respective PCWP members.
  - 5) Low-Impact Development (LID). A land development and management approach whereby stormwater runoff is managed using design techniques that promote infiltration, filtration, storage, evaporation, and temporary detention close to its source. Management of such stormwater runoff sources may include open space, rooftops, streetscapes, parking lots, sidewalks, medians, etc.
  - 6) Water Quality LID. A level of LID using strategies designed to provide for water quality control of the first ½ inch of stormwater runoff generated from each new development or significant redevelopment and to maintain the peak discharge rates during the 2-year storm event to baseline land use conditions, measured at every drainage (stormwater discharge) outlet from the new development or significant redevelopment.
  - 7) Maximum LID. A level of LID using strategies, including water quality LID and on-site detention, designed not to exceed peak discharge rates of more than 0.2 cfs/acre during the 2-year storm event or 0.5 cfs/acre during the 100-year storm event based on the contributing drainage from each site, measured at every drainage (stormwater discharge) outlet from the new development or significant redevelopment.
  - 8) Baseline Land Use Conditions. That which existed for Year 2001 for Big and Little Papillion Creeks and its tributaries (excluding West Papillion Creek) and for Year 2004

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for West Papillion Creek and its tributaries. That which existed in 2007 for all areas not within the Papillion Creek Watershed.

**BASIS FOR STORMWATER MANAGEMENT FINANCING ISSUE**

- 1) Time is of the essence for policy development and implementation:
  - a) Under the existing NPDES Municipal Stormwater Permits for MS4s, issued by the Nebraska Department of Environmental Quality, permittees must develop strategies, which include a combination of structural and/or non-structural best management practices for managing non-point source pollution. The current Stormwater Management Plan was developed by the PCWP in 2017 and fully implemented in 2018.
  - b) The S&ID platting process is typically several years ahead of full occupation of an S&ID. Therefore, careful pre-emptive planning and program implementation is necessary in order to construct regional stormwater detention and water quality basin improvements in a timely manner to meet the purposes intended and to avoid conflicts from land use encroachments from advancing development.
- 2) Financing to meet capital and O&M obligations for stormwater management projects requires a comprehensive, uniformly applied approach and not a project-by-project approach.