

MEMORANDUM

DATE: April 19, 2016

TO: Keith Hunke
City Administrator

FROM: Michelle Klose, P.E. *MK*
Director of Utility Operations

RE: Agenda Item - Tyler Coulee Watershed Master Plan (2016 Update) Presentation

Please schedule this item for consideration by the Board of City Commissioners at the meeting scheduled for Tuesday, April 26, 2016.

The Tyler Coulee Watershed Master Plan study (2016 Update) is an update to the 2007 Final Report and eliminates using the roadway embankments to detain storm water as originally proposed. Use of roadway embankments as storm water detention would classify the road embankments as high hazard dams by the State Water Commission, and would prohibit utilities from being placed with in the road right of ways.

The study also develops a comprehensive master plan for the regional watershed improvements within Tyler Coulee that would be necessary to address existing and future development. A summary of the updated plan is attached for your review.

Jeff Hruby of AE2S will present the recommendations of the updated plan and answer any questions you may have.

We request acceptance of the plan so that its recommendations can be incorporated into future development in this area.

Enc. Summary of Tyler Coulee Storm Water Master Plan

Cc: Mel Bullinger, P.E., City Engineer
Charlie Whitman, City Attorney

Technical Memorandum

To: Brad Wright, PE, Michelle Klose, PE

Cc: Mel Bullinger, PE
Terry Halstengard
Linda Oster, PE

From: Jeffrey Hruby, PE, Jonathan Lefers, PE (AE2S)

Re: **Tyler Coulee Stormwater Master Plan Alternative**

Date: April 19, 2016

This document was originally issued and sealed by:

Jeffrey M. Hruby, PE
Registration Number PE-5403

and

Jonathan D. Lefers, PE
Registration Number PE-7830

on

April 19, 2016

and the original documents are stored at the office of Advanced Engineering and Environmental Services, Inc.

Recommendation

We recommend that the City adopt the modified Tyler Coulee Stormwater Master Plan (TCSWMP) displayed in *Figure 1* and described in further detail in the attached February 19, 2015 memorandum.

Background

1. The current TCSWMP, completed in 2007, requires constructing two State-permitted High Hazard Dams at the Valley Drive and Tyler Parkway road crossings;
2. The State Water Commission prohibits water and sanitary utilities being placed in any dam embankments;
3. The City retained AE2S in October 2014 to re-evaluate the regional stormwater management options, specifically with the goal of eliminating the high hazard dams from the TCSWMP.
4. AE2S prepared a modified TCSWMP that meets the City's stormwater management criteria and eliminates the need for the two High Hazard Dams (*Figure 1* and attached memorandum);
5. AE2S and City staff met with State Water Commission, and the State Water Commission agreed that the modified plan would eliminate State-permitted regulatory dams and noted that the modified plan was a significant improvement to reducing risk associated with storage upstream of embankments;
6. The modified TCSWMP would allow the City to install utilities along Valley Drive and Tyler Parkway to serve expanding development to the north and west of Tyler Coulee, avoiding the need to gain additional easements outside of the road right-of-way;
7. AE2S prepared an opinion of probable cost for the modified TCSWMP improvements (*Table 1* and attached detailed OPC estimates for each facility); and
8. Because the proposed Valley Drive and Tyler Parkway embankments are now road culverts in the modified TCSWMP versus High Hazard Dams in the current TCSWMP, based on City policy, the City's costs for these roadways would be the pipe and a small amount of fill over the pipe versus paying for the entire dam embankment that would have been necessary with the current TCSWMP.

Technical Memorandum

Re: Tyler Coulee Stormwater Master Plan Alternative

April 19, 2016

Modified TCSWMP Summary

The following proposed detention and conveyance facilities would be removed from the plan:

- Valley Drive High Hazard Dam and outlet works, including a 25-foot high embankment, 48-inch RCP low-flow outlet structure, 25-foot high 20'x16' cast-in-place box riser structure, and 220 feet of 12'x8' outlet box culvert.
- Tyler Parkway High Hazard Dam and outlet works, including a 38-foot high embankment, 36-inch RCP low-flow outlet structure, 32-foot high 15'x12' cast-in-place box riser structure, and 250 feet of 8'x6' box outlet culvert.
- Three regional detention ponds (shown as Branch Storage Southwest, West, and East in *Figure 1*).

The following proposed detention facilities would need to be constructed:

- One new detention facility upstream of Clairmont Drive;
- One new detention facility upstream of Valley Drive;
- One new detention facility upstream of Tyler Parkway;
- One new detention facility immediately downstream of the Eagle Crest Subdivision (this facility was outlined in the current TCSWMP but has not been constructed yet); and
- Developer-constructed water quality treatment facilities to meet the City's MS4 permit for the areas draining to the previously-proposed, regional Branch Storage West, Southwest, and East facilities shown in *Figure 1*.

Conveyance improvements that are needed are as follows:

- Additional 54" culvert under Clairmont Drive to increase conveyance capacity;
- Single 84" culvert under Valley Drive embankment;
- Single 96" culvert under the future Tyler Parkway embankment;
- Additional 6'x6' box culvert under River Road; and
- Grading and channel improvements through Pioneer Park.

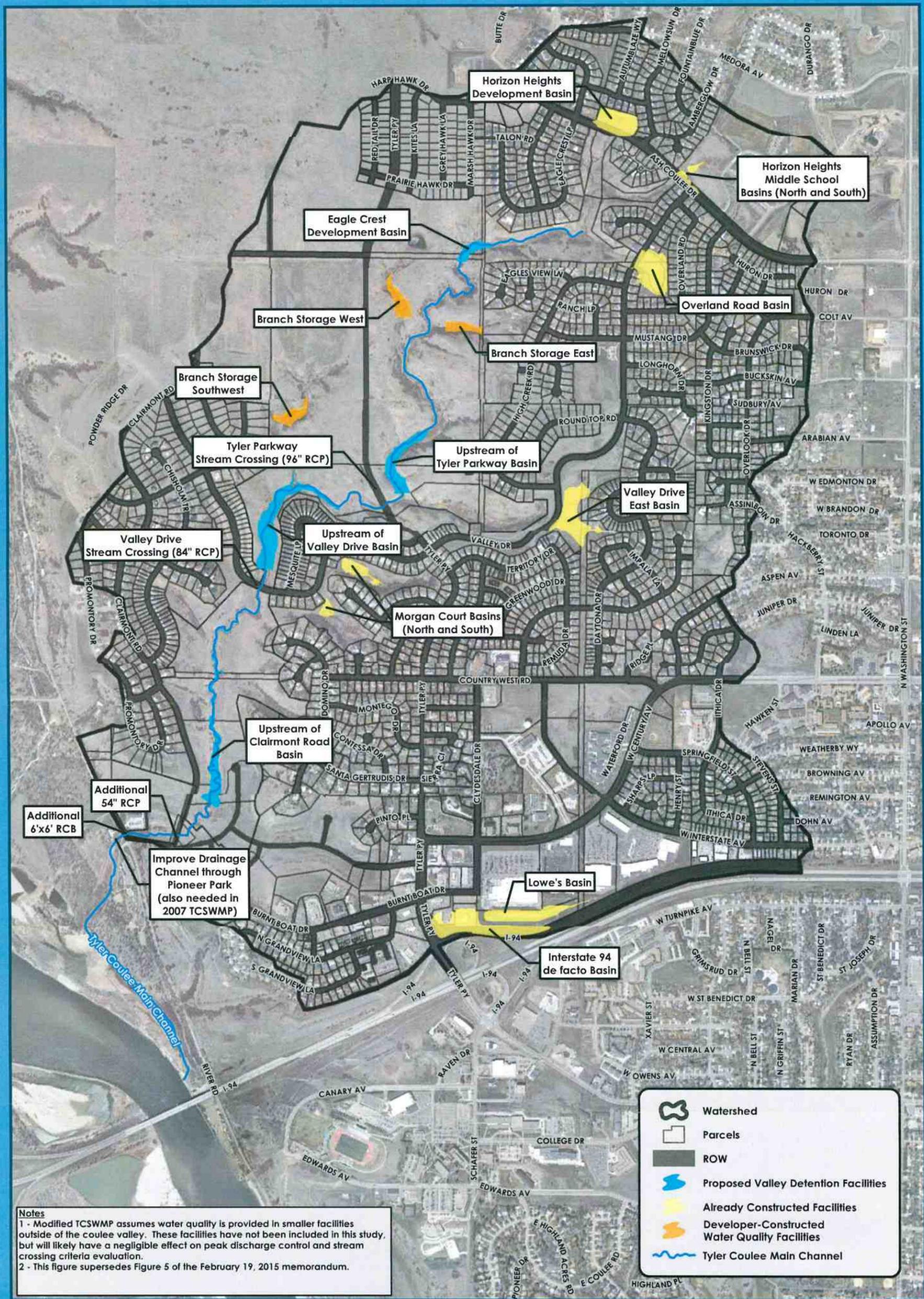
Table 1 summarizes the costs for these improvements, noting that the water quality treatment facilities have not been included in these costs, as they are intended to be designed and constructed by the individual developments and not as regional facilities.

Table 1: Modified TCSWMP – Improvement Costs

Coulee and Facility Name	Facility Type	Opinion of Probable Cost ¹
Clairmont Drive - Upstream Detention	Regional Detention	\$656,700
Clairmont Drive - Additional Culvert	Road Crossing	\$573,185
Valley Drive - Upstream Detention	Regional Detention	\$612,600
Valley Drive - New Culvert	Road Crossing	\$549,695
Tyler Parkway - Upstream Detention	Regional Detention	\$522,750
Tyler Parkway - New Culvert	Road Crossing	\$776,910
Eagle Crest - Detention	Regional Detention	\$386,100
River Road - Additional Culvert	Road Crossing	\$162,255
Pioneer Park - Channel Grading	Conveyance	\$153,265
Grand Total		\$4,393,460 ²

¹ Does not include land acquisition or easement costs.

² Does not include on-site or regional water quality facility costs.



Any reliance upon this map is at user's own risk. AES does not warrant the map or its features are either spatially or temporally accurate or fit for a particular use.

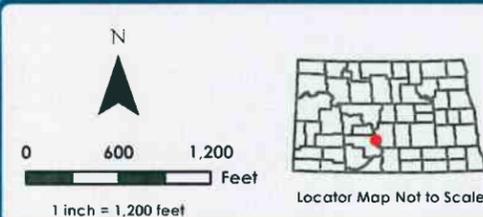


Figure 1
Modified TCSWMP Improvements
Tyler Coulee Stormwater Master Plan Revision
City of Bismarck | Burleigh County, ND





TYLER COULEE STORMWATER Master Plan Alternative

Bismarck City Commission

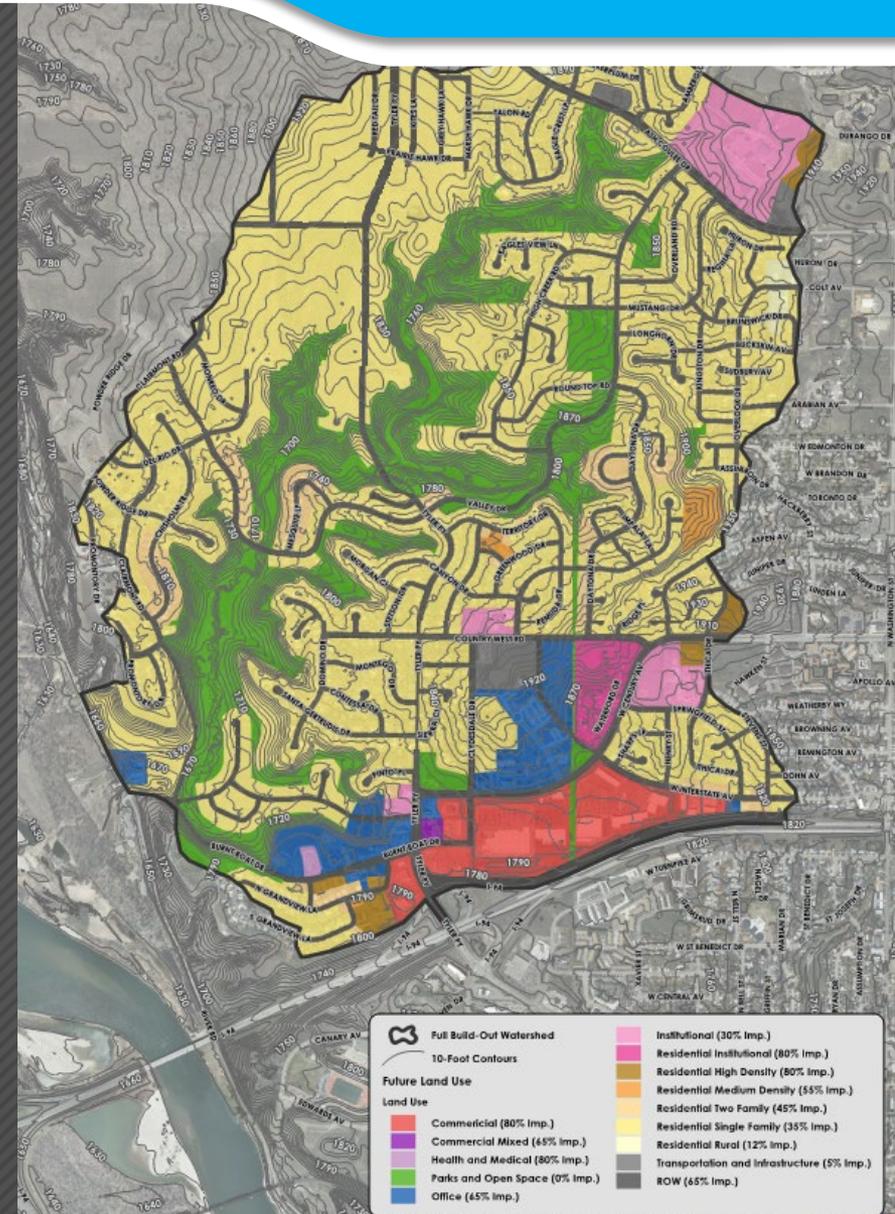
April 26th, 2016

Presented by: Advanced Engineering and Environmental Services, Inc. (AE2S)

WATERSHED LOCATION



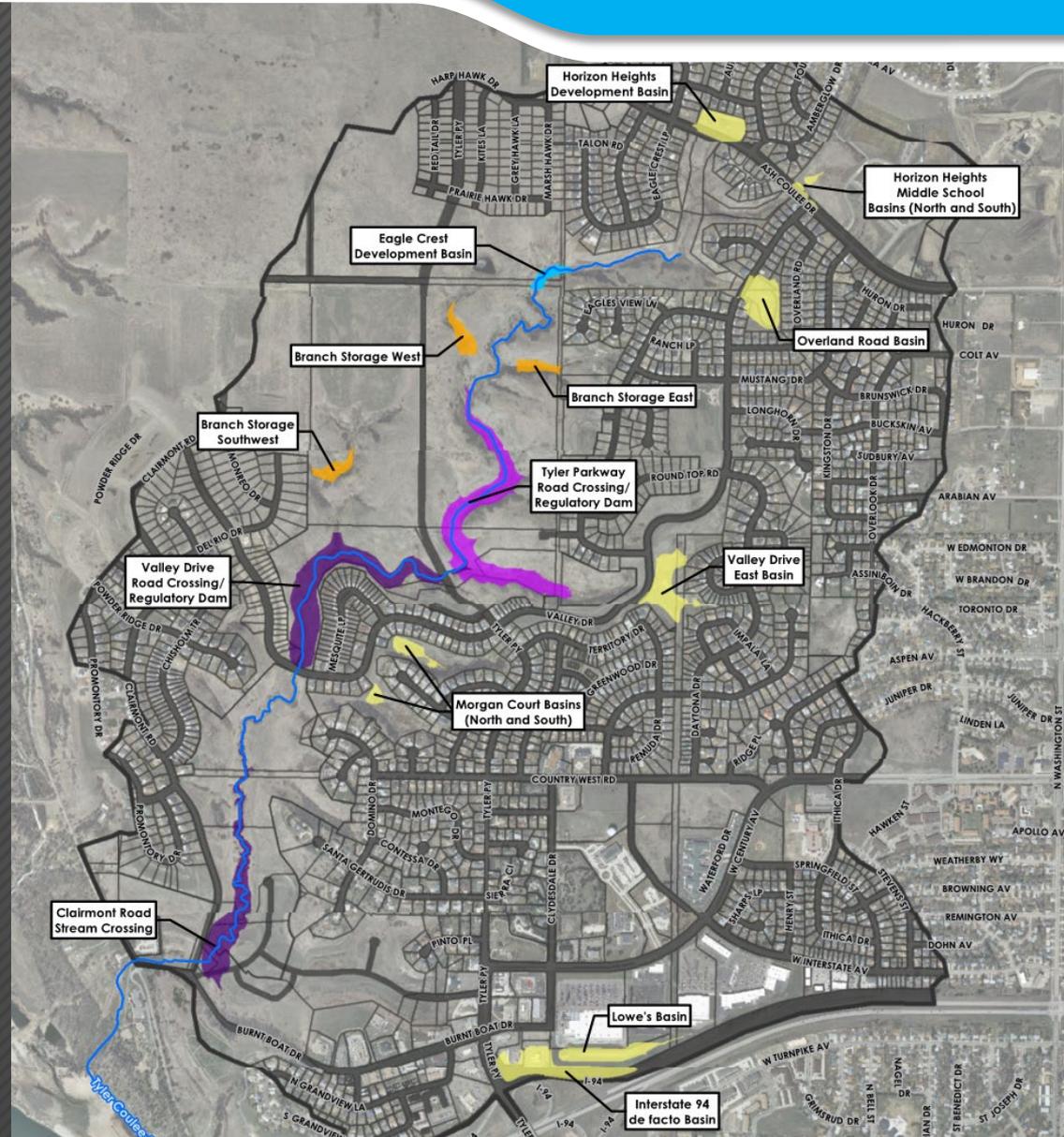
- Northwest Bismarck
- ~1,870 Acres
- Largely Developed
- Drains Through Pioneer Park to Missouri River



CURRENT MASTER PLAN



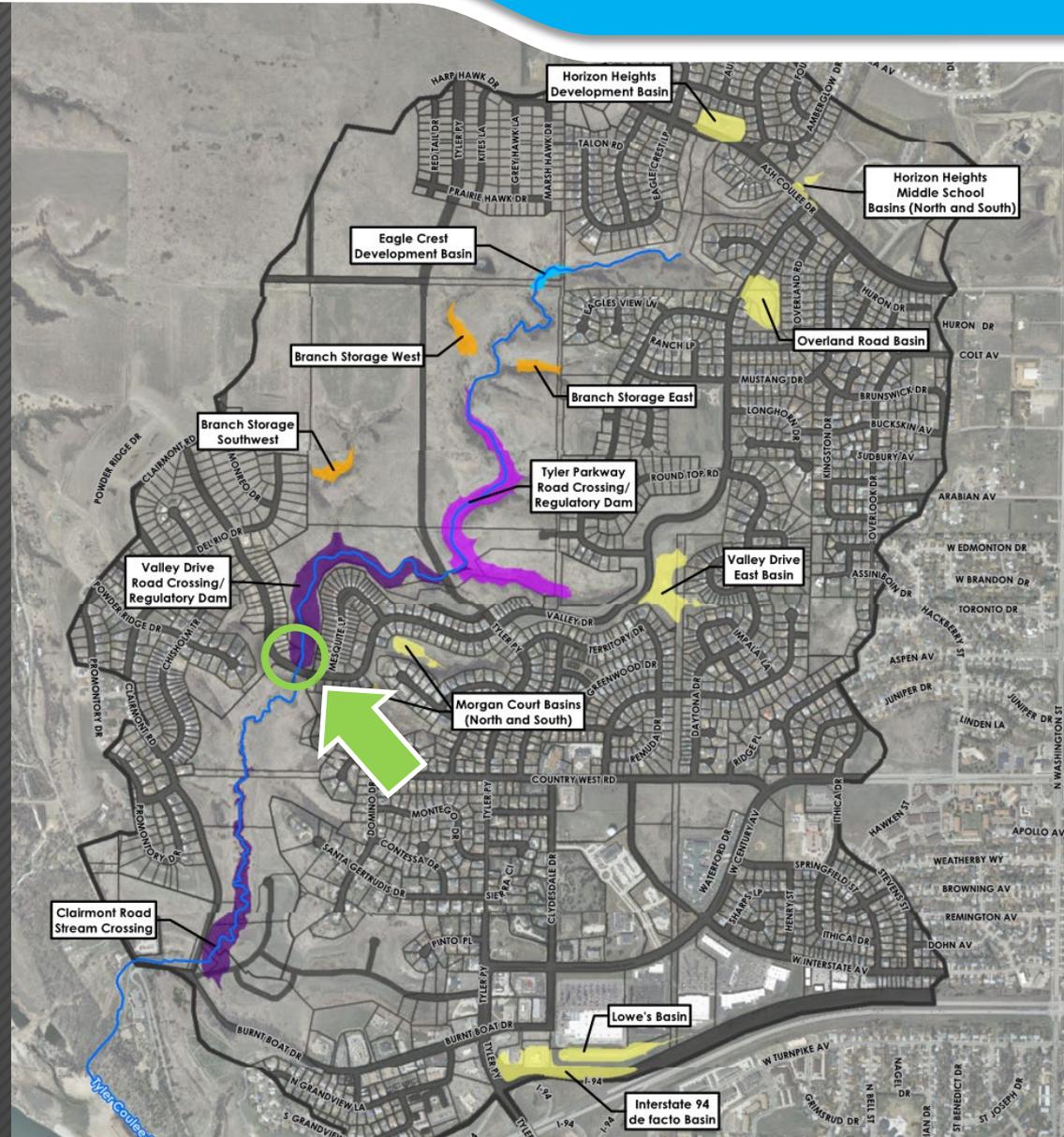
- Current SWMP adopted in 2007
- Many Improvements Already Constructed
- Several Improvements Yet to be Constructed



CURRENT MASTER PLAN



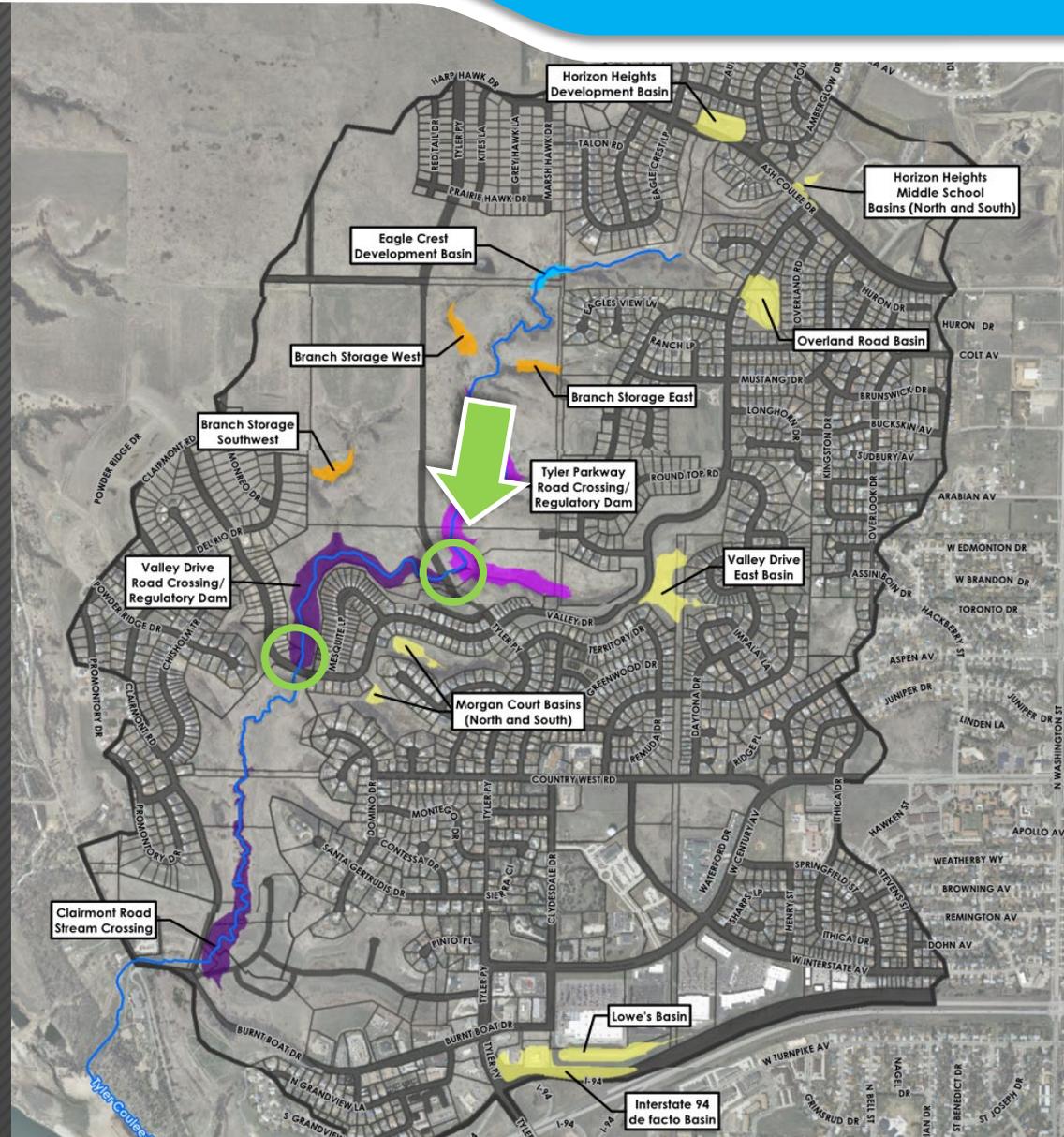
- Current SWMP adopted in 2007
- Many Improvements Already Constructed
- Several Improvements Yet to be Constructed
 - **Valley Drive High Hazard Dam**



CURRENT MASTER PLAN



- Current SWMP adopted in 2007
- Many Improvements Already Constructed
- Several Improvements Yet to be Constructed
 - Valley Drive High Hazard Dam
 - Tyler Parkway High Hazard Dam

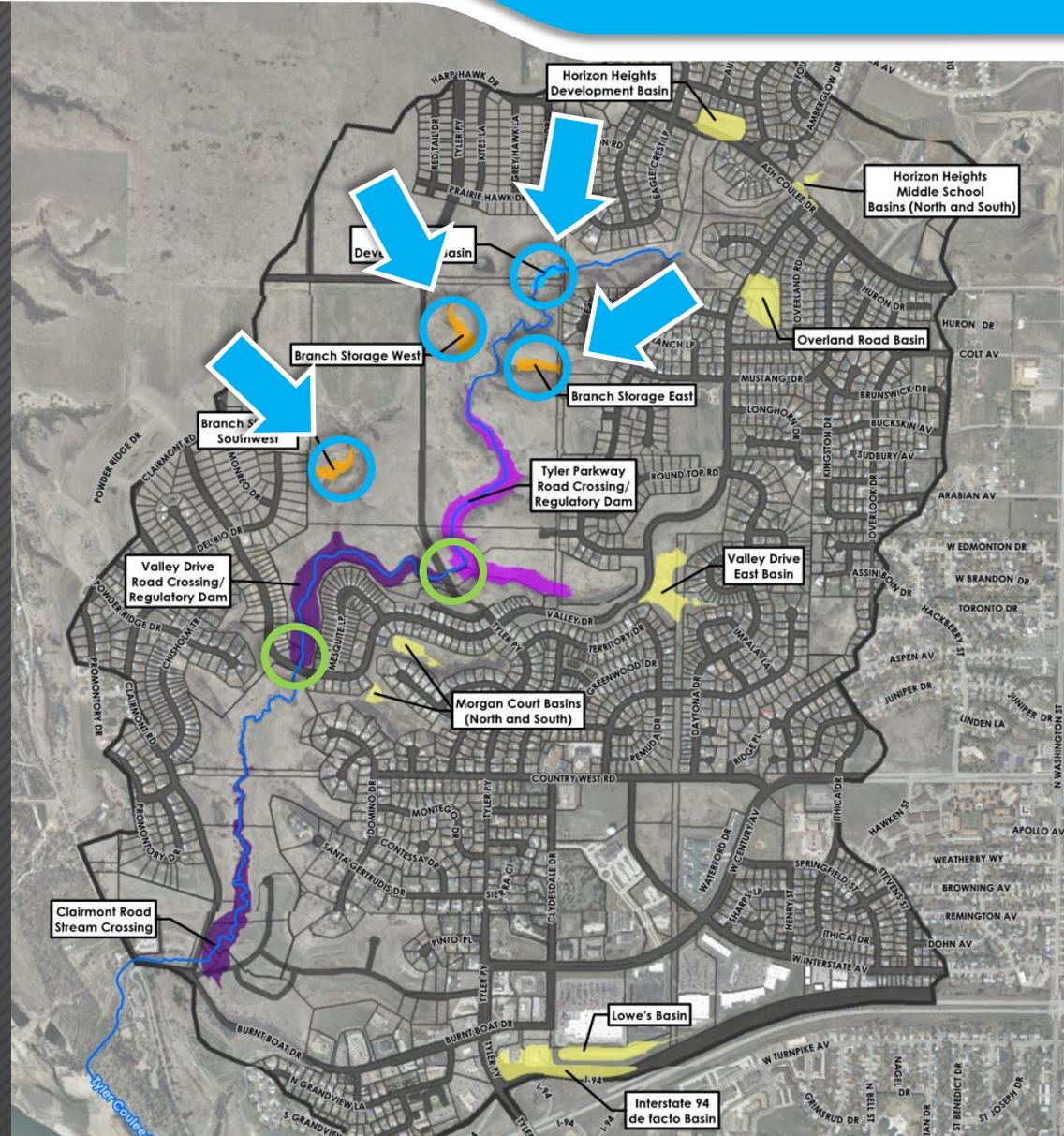


CURRENT MASTER PLAN



Several Improvements
Yet to be Constructed:

- Valley Drive High Hazard Dam
- Hazard Dam
- Tyler Parkway High Hazard Dam
- Eagle Crest Detention Basin
- Branch Storage Southwest Detention Basin
- Branch Storage West Detention Basin
- Branch Storage East Detention Basin
- Morgan Court Basins (North and South)
- Valley Drive East Basin
- Tyler Parkway Road Crossing/Regulatory Dam
- Valley Drive Road Crossing/Regulatory Dam
- Dev's Basin
- Horizon Heights Development Basin
- Horizon Heights Middle School Basins (North and South)
- Overland Road Basin
- Lowe's Basin
- Interstate 94 de facto Basin





CHALLENGES WITH DAMS

CURRENT MASTER PLAN



Challenges with Dams

- **Water and Sewer Utilities Prohibited Through Dam**



CURRENT MASTER PLAN



Challenges with Dams

- Water and Sewer Utilities Prohibited Through Dam
- **Significant Spillway Capacity**





Challenges with Dams

- Water and Sewer Utilities Prohibited Through Dam
- Significant Spillway Capacity
- **Cost**



CURRENT MASTER PLAN



Challenges with Dams

- Water and Sewer Utilities Prohibited Through Dam
- Significant Spillway Capacity
- Cost
- **Permitting / Inspections / Liability**

North Dakota Dam Design Handbook

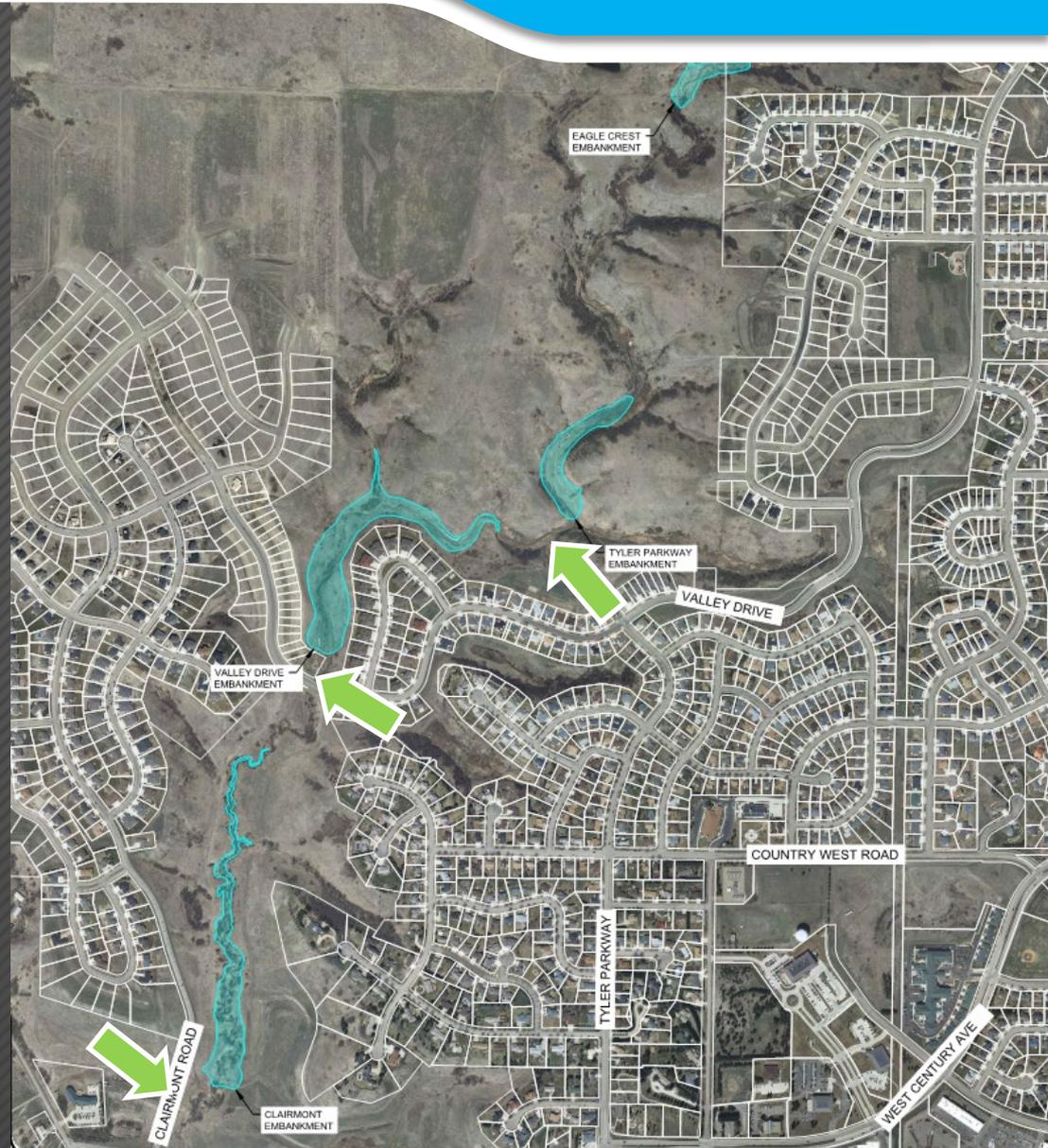


ALTERNATIVE MASTER PLAN



Tyler Parkway and Valley Drive Dams Replaced with Stream Crossings

Clairmont Road higher capacity to remain as Stream Crossing



ALTERNATIVE MASTER PLAN

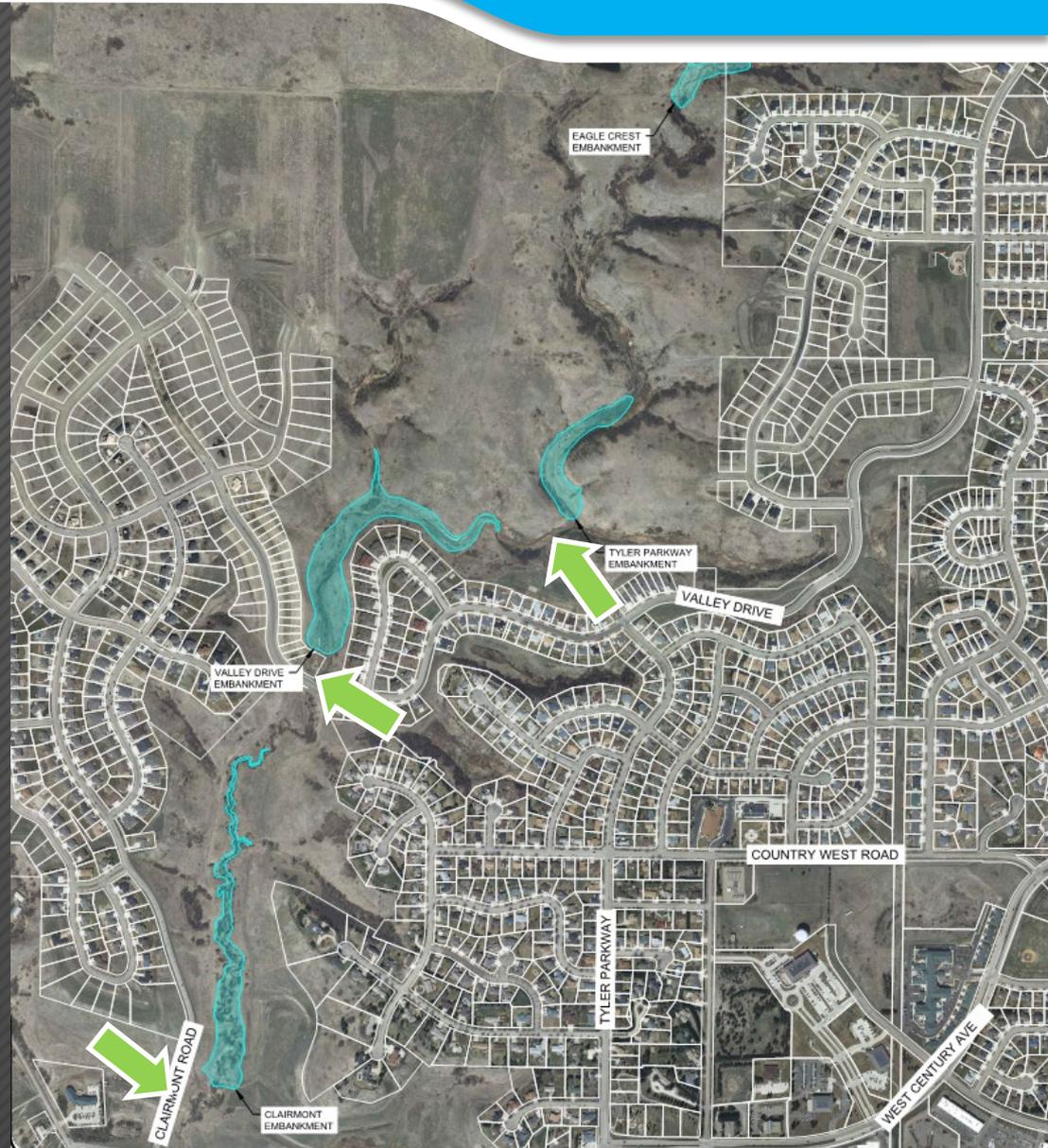


Tyler Parkway and Valley Drive

- Large Outlet Works and Spillways Replaced with Large Diameter Circular Pipe (84"-96")
- Street Embankments Can Be Utilized for Water and Sewer Utilities

Clairmont Road

- Additional 54" Circular Pipe

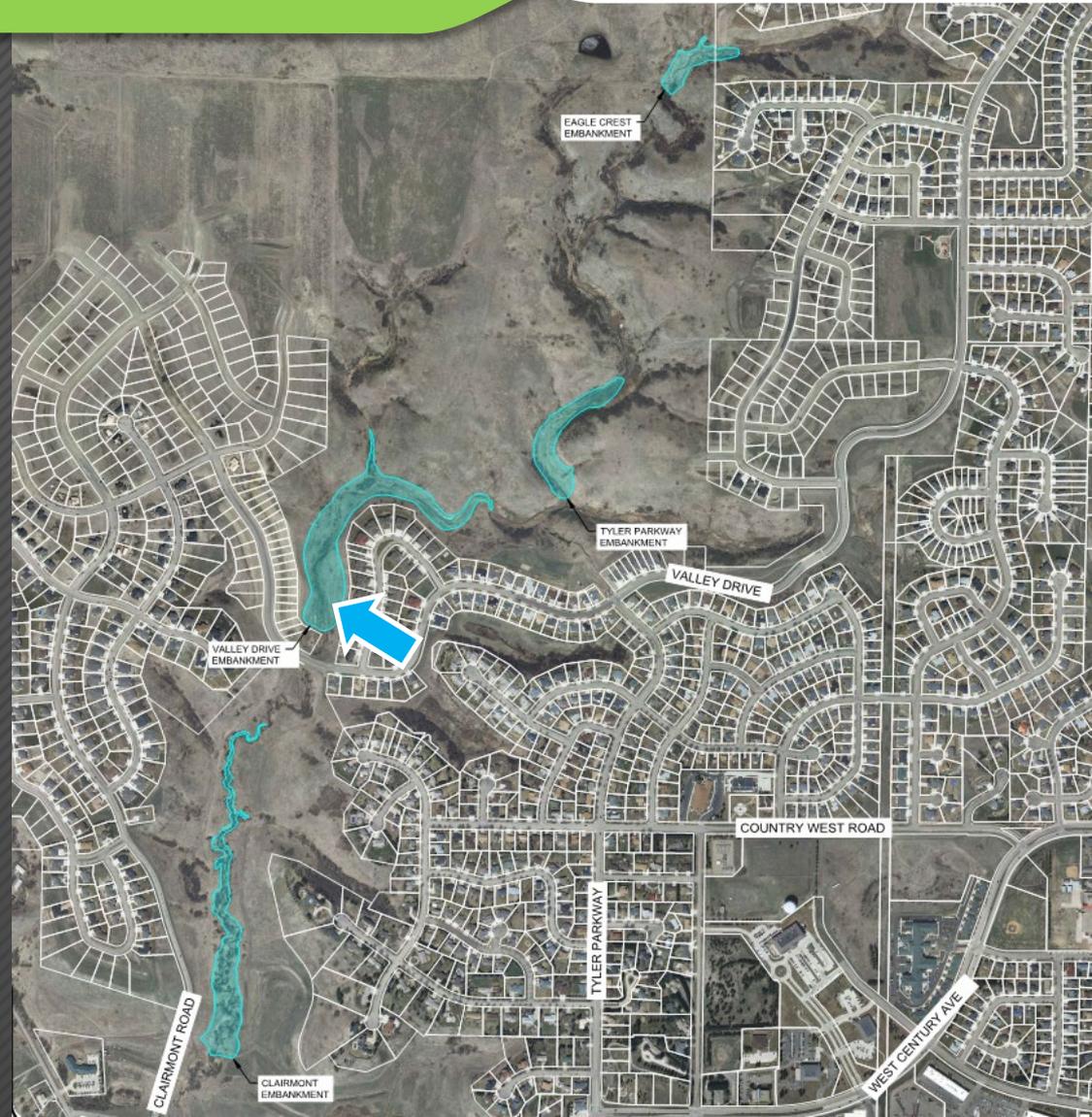


ALTERNATIVE MASTER PLAN



Detention Achieved With:

- Valley Drive Detention Basin

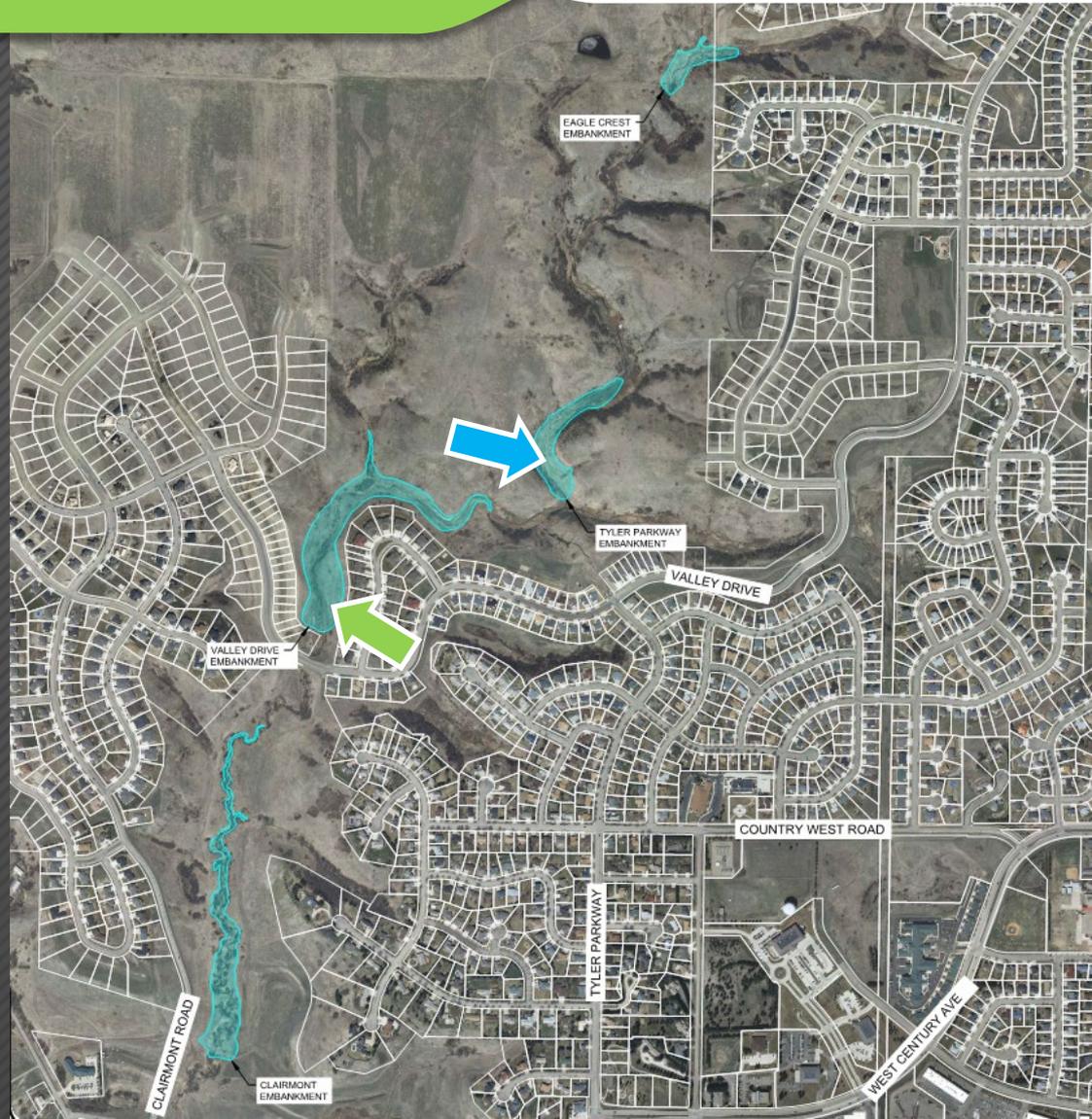


ALTERNATIVE MASTER PLAN



Detention Achieved With:

- Valley Drive Detention Basin
- Tyler Parkway Detention Basin

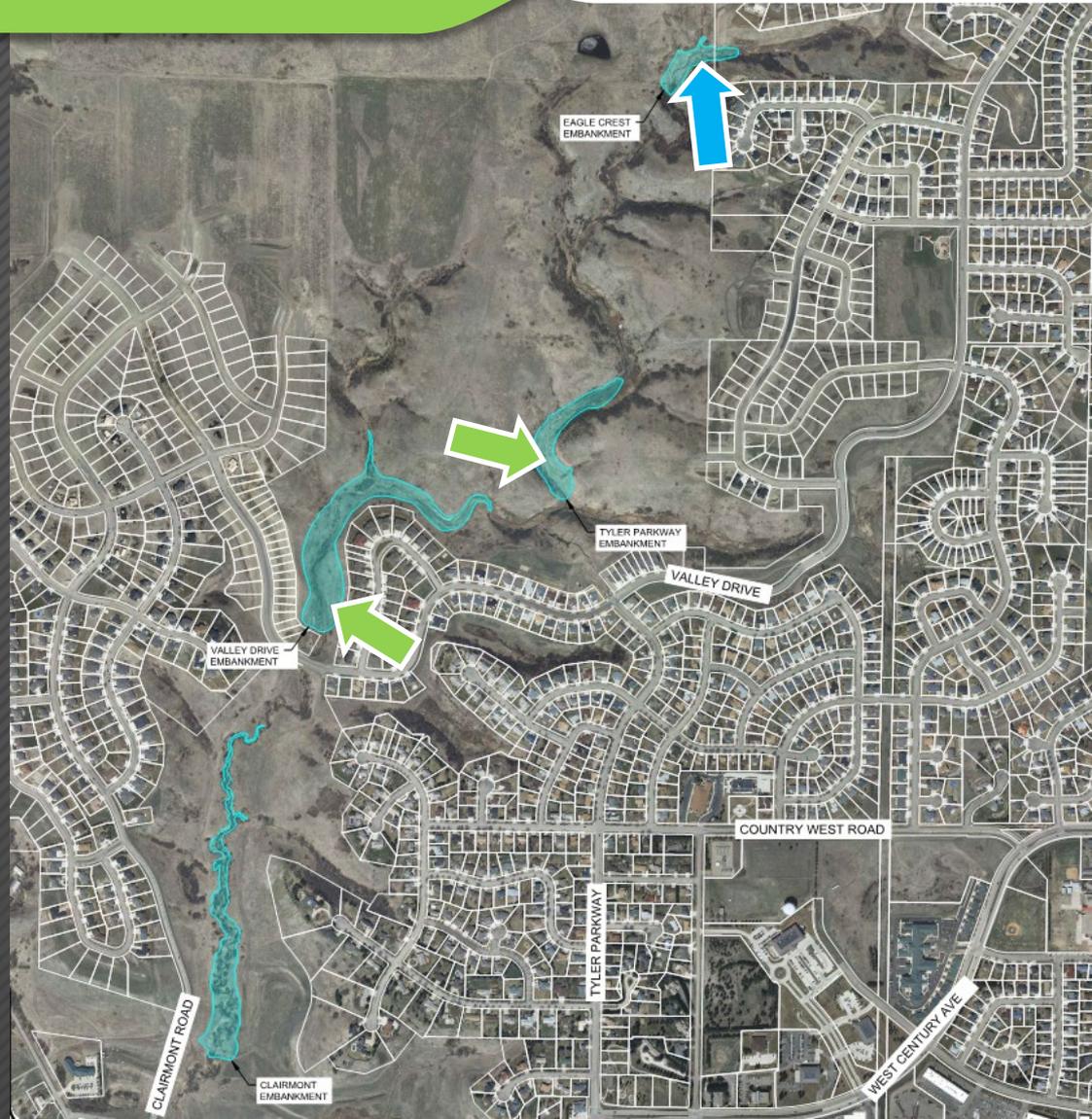


ALTERNATIVE MASTER PLAN



Detention Achieved With:

- Valley Drive Detention Basin
- Tyler Parkway Detention Basin
- **Eagle Crest Detention Basin**

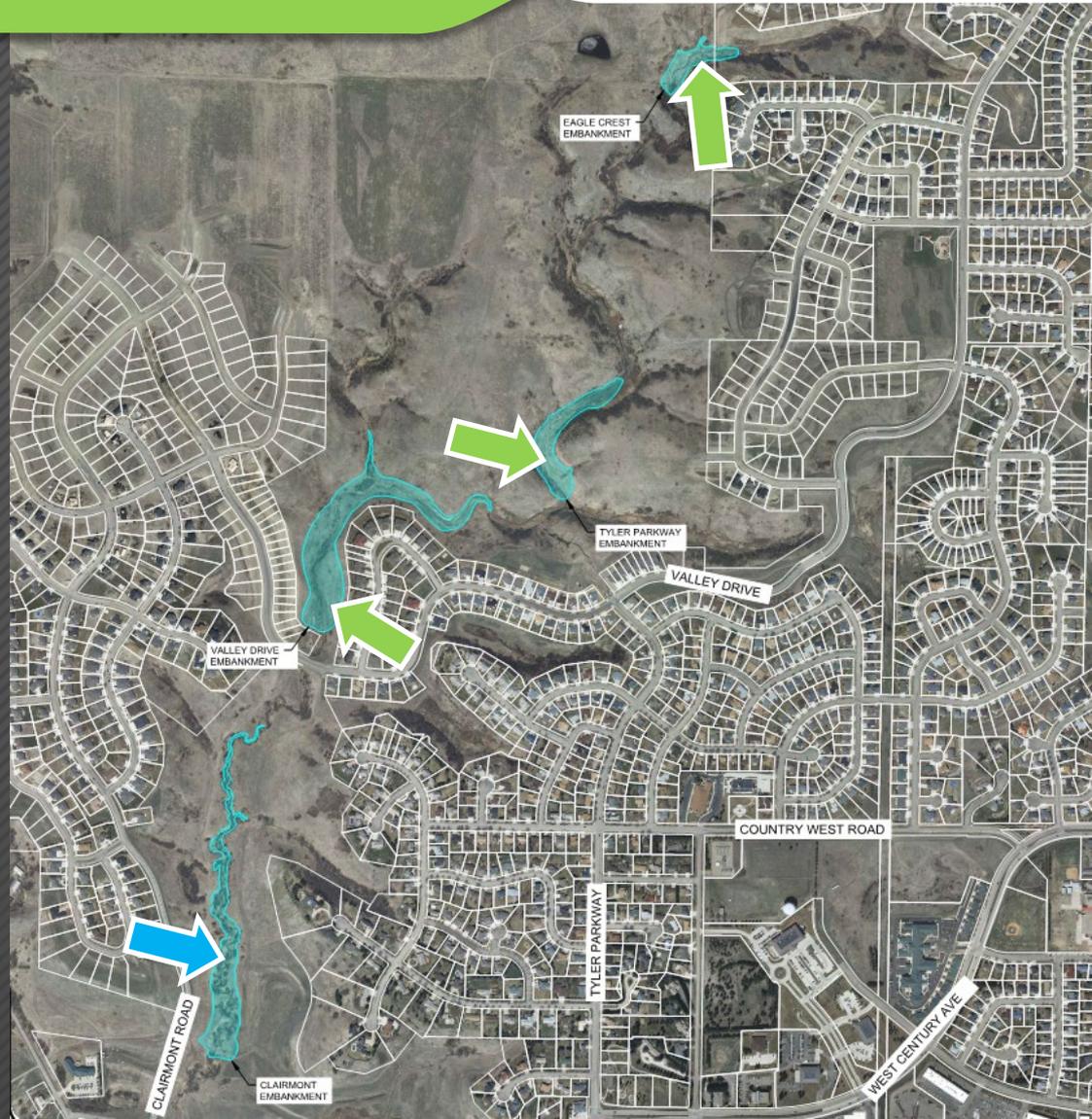


ALTERNATIVE MASTER PLAN



Detention Achieved With:

- Valley Drive Detention Basin
- Tyler Parkway Detention Basin
- Eagle Crest Detention Basin
- **Clairmont Road Detention Basin**

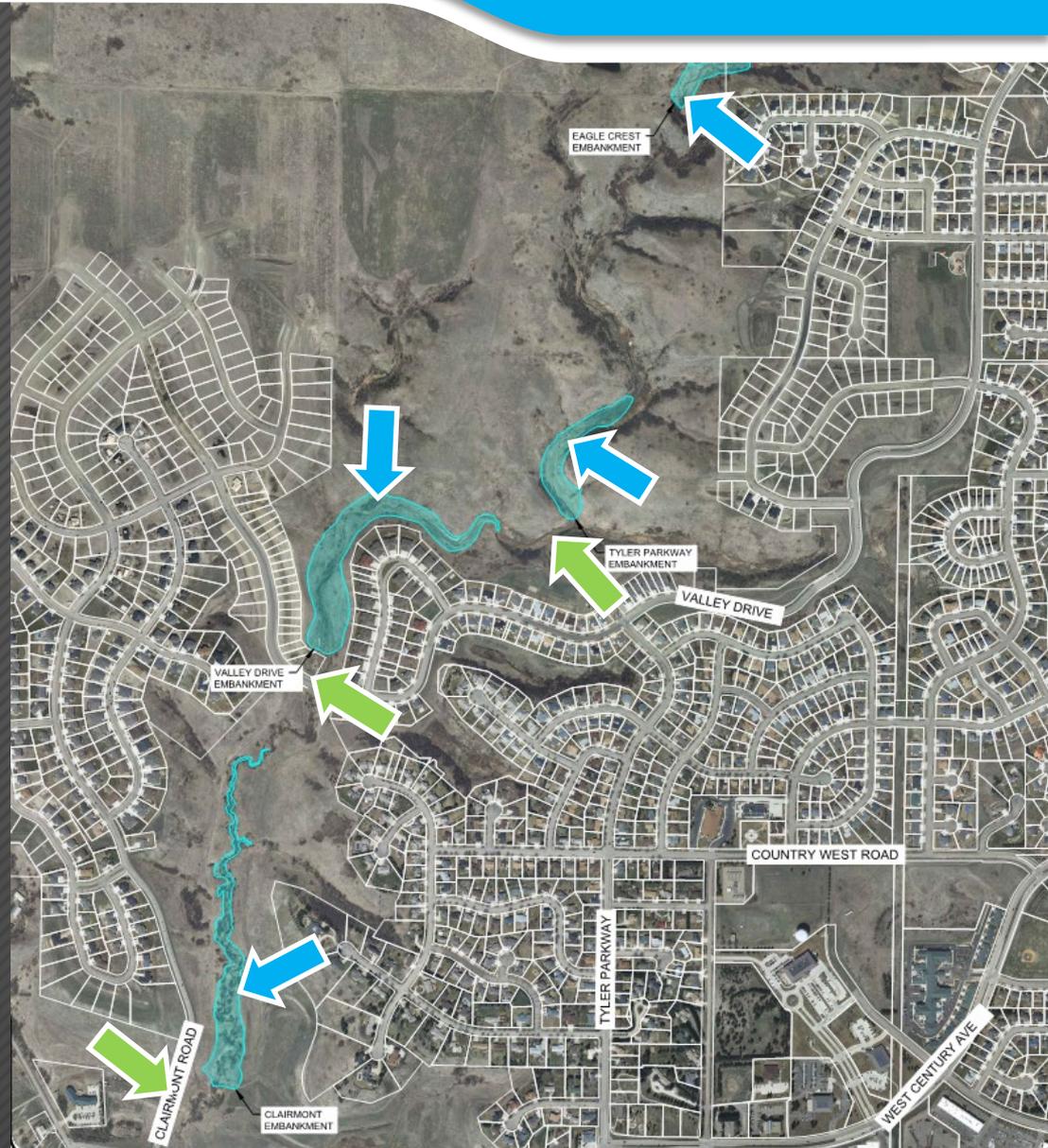


ALTERNATIVE MASTER PLAN



Approach, Concept, Results

- Verified with State Water Commission

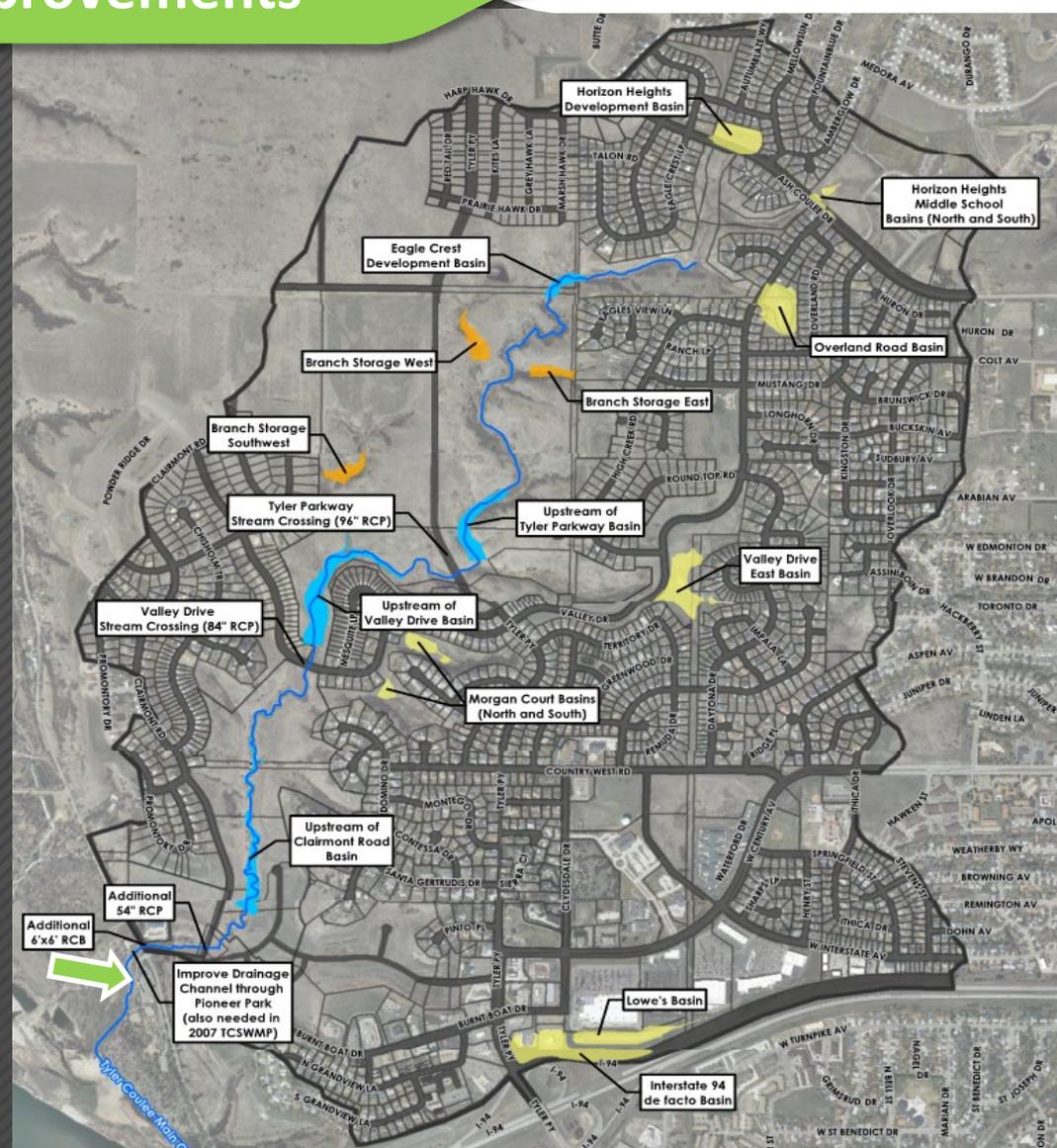


ALTERNATIVE MASTER PLAN



Additional Recommended Improvements

- Pioneer Park Channel

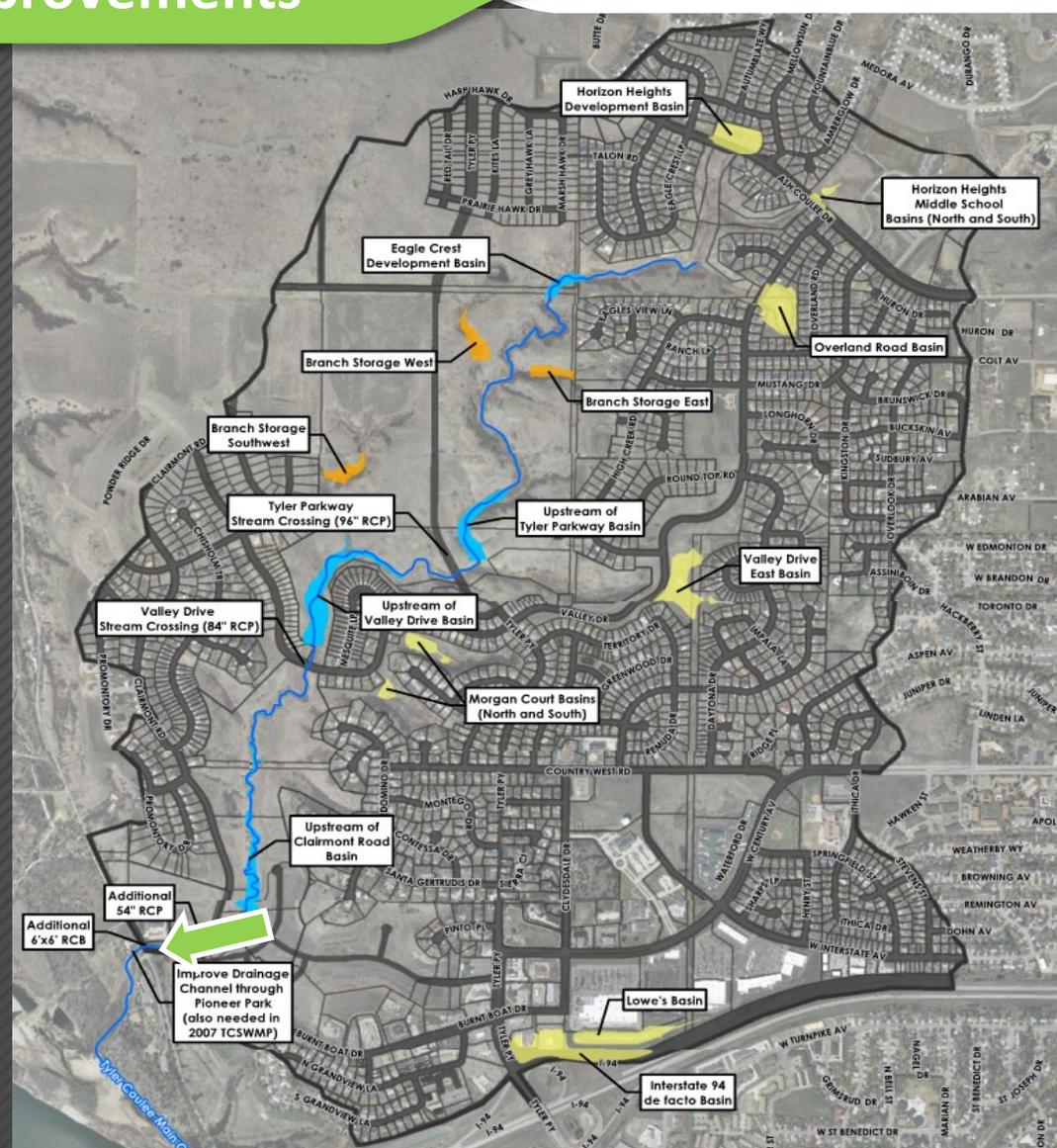


ALTERNATIVE MASTER PLAN



Additional Recommended Improvements

- Pioneer Park Channel
- River Road

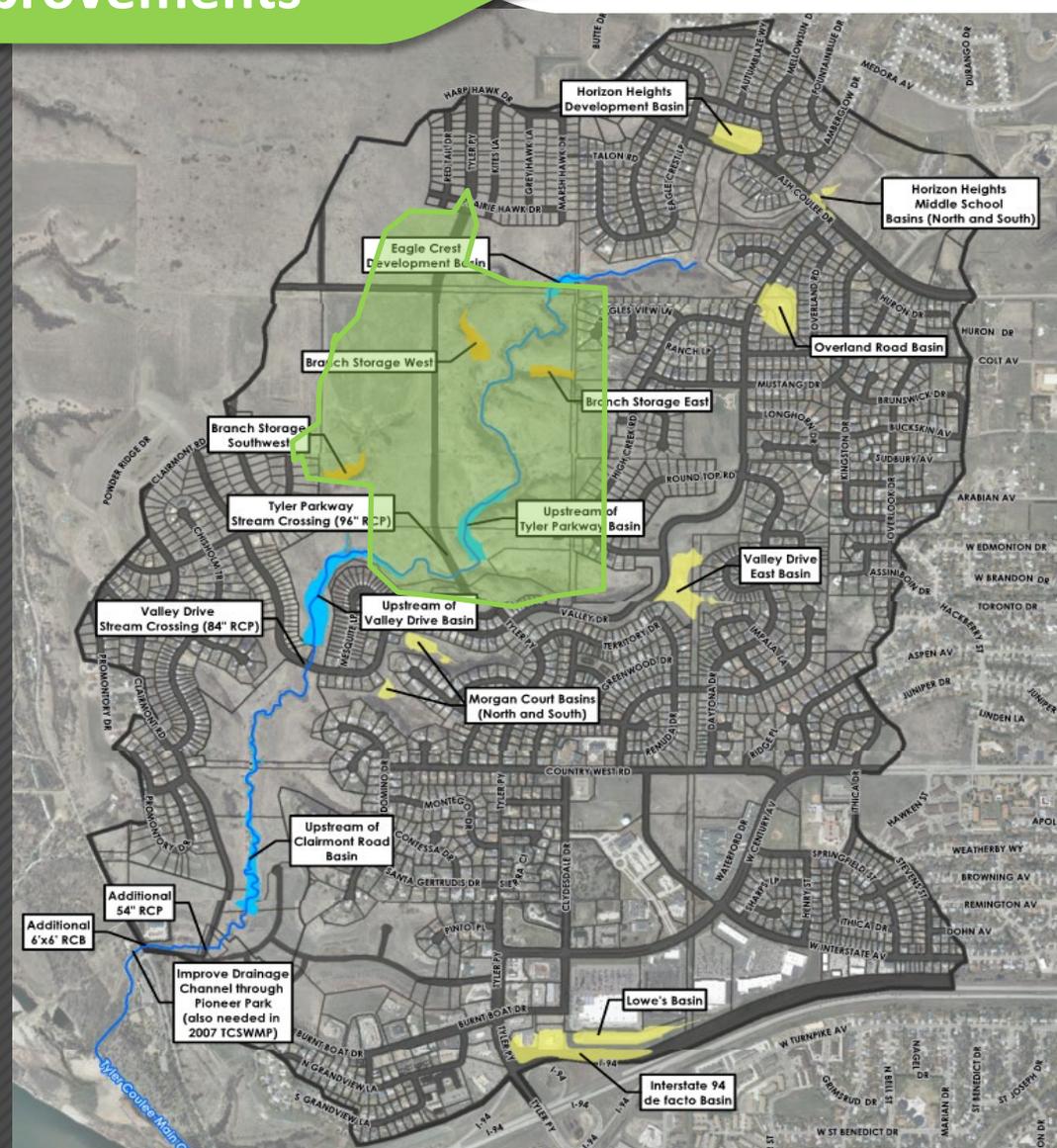


ALTERNATIVE MASTER PLAN



Additional Recommended Improvements

- Pioneer Park Channel
- River Road
- Developer-Constructed Water Quality Basins



ESTIMATED COSTS



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Does not include costs savings from eliminating complex outlet structures under Valley Drive and Tyler Parkway, re-routing utilities, and dam Operation and Maintenance

QUESTIONS?



Bismarck City Commission

April 26th, 2016