Bismarck

SILVER RANCH WATERSHED

STORMWATER MASTER PLAN

The Silver Ranch Watershed Master Plan Study evaluated the existing and proposed runoff conditions for all of the areas upstream of East Main Avenue that contribute to the Silver Ranch Watershed, a tributary to Apple Creek. This watershed encompasses an area of approximately 6.4 square miles.

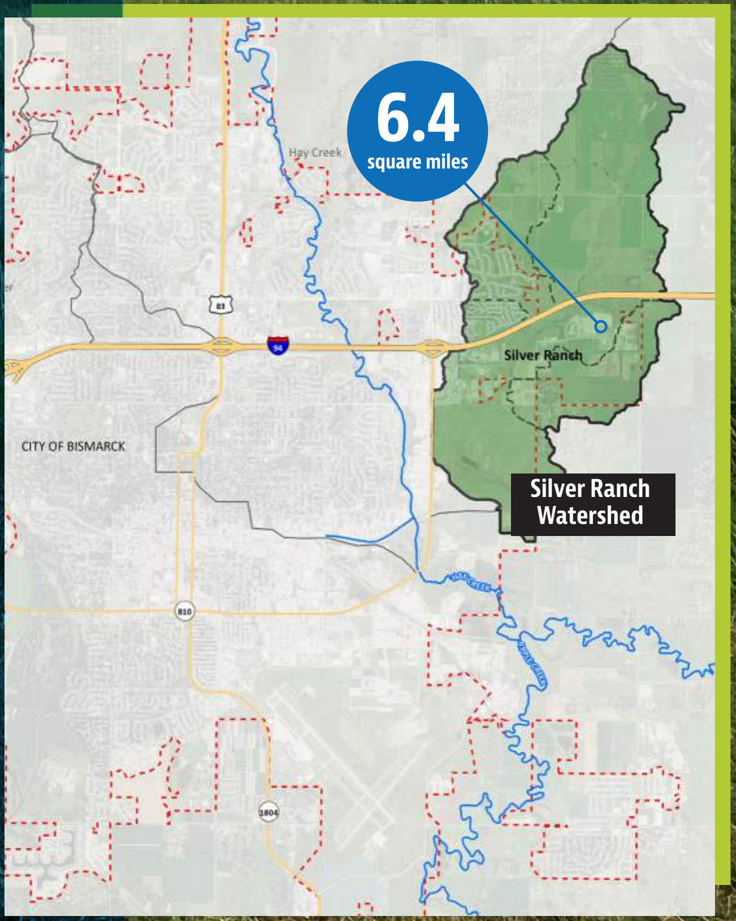
Purpose of Study: Develop a comprehensive approach that manages stormwater on a watershed scale and provides adequate drainage consistent with the City's ordinances.

Goals

Development of the Silver Ranch Master Plan included the input of a City-designated Working Group. The intent of this group was to bring major City departments tasked with implementation into the development of this Master Plan. The Working Group established four primary goals for the success of the Master Plan. These goals were used to determine the most effective stormwater management concept to be utilized in the Silver Ranch Watershed.

	Stormwater Management Concepts		
PRIMARY GOALS	Local Pre-Post	Regional Pre-Post	Local Unit Rate
1. Minimize Downstream Impacts from Urbanization		✓	✓
2. Match Pace of Development	✓		✓
3. Flexible Funding and Minimized Financial Impacts to City	✓		✓
4. Integrate with Applicable Planning Documents	✓	✓	✓

Best Option = Local Unit Rate



STORMWATER MASTER PLAN **RECOMMENDATIONS**

1

PEAK RUNOFF
within Silver Ranch Watershed Shall Not Exceed Designated Unit Rate

2

DEVELOPER IS RESPONSIBLE
for the construction costs of required stormwater BMPs

3

DEVELOPMENT OF STANDARD POLICY
for Long-Term Maintenance & Operation of Required Facilities

4

IMPLEMENT A DEVELOPMENT SETBACK LINE
to Maintain Drainage and Runoff Storage Corridors

5

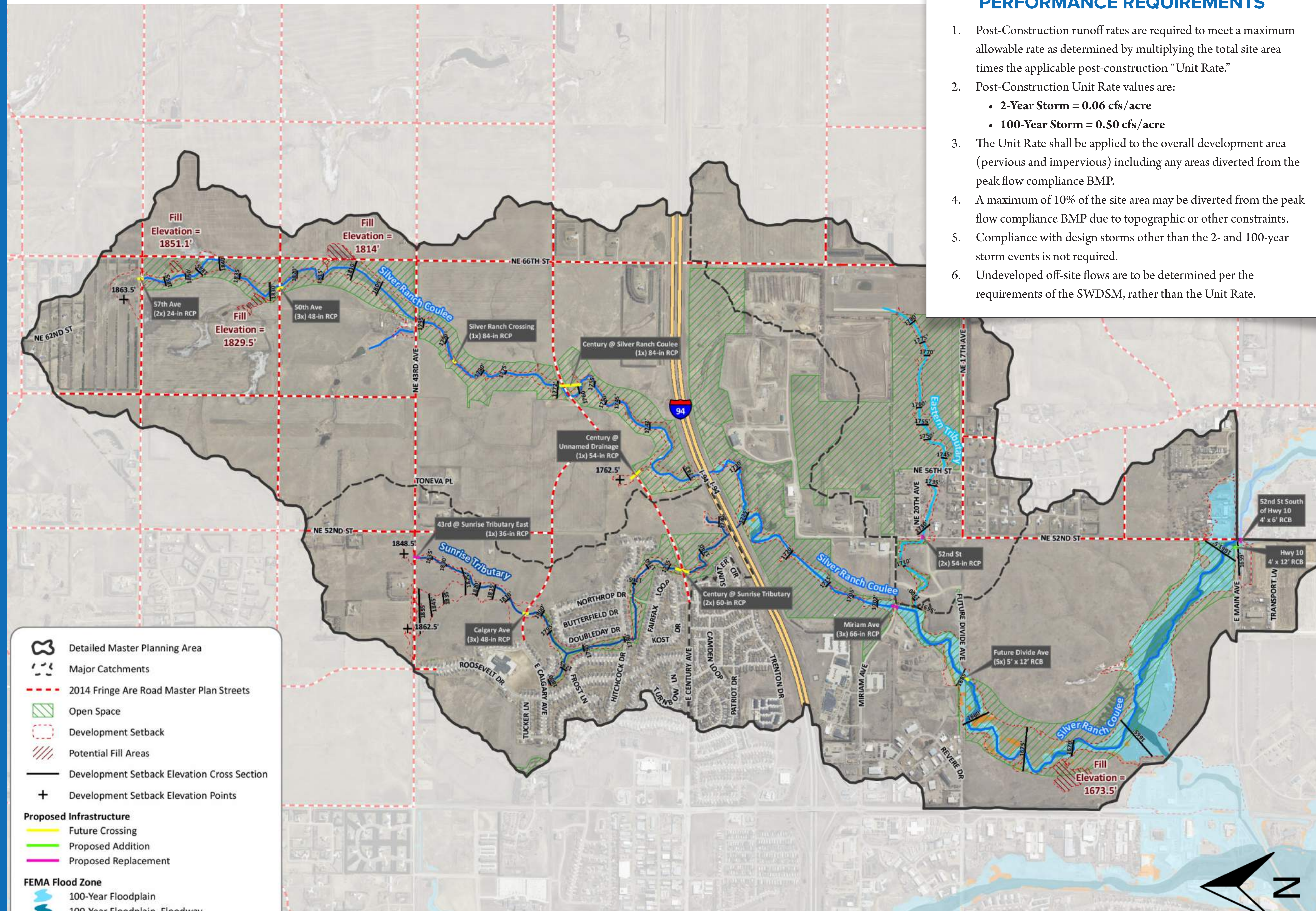
ARTERIAL ROADS
shall Achieve Water Quality Requirements Only

6

Hay Creek & Silver Ranch Watershed
CONNECTION SHOULD REMAIN OPEN AND ACTIVE

PERFORMANCE REQUIREMENTS

1. Post-Construction runoff rates are required to meet a maximum allowable rate as determined by multiplying the total site area times the applicable post-construction "Unit Rate."
2. Post-Construction Unit Rate values are:
   - **2-Year Storm = 0.06 cfs/acre**
   - **100-Year Storm = 0.50 cfs/acre**
3. The Unit Rate shall be applied to the overall development area (pervious and impervious) including any areas diverted from the peak flow compliance BMP.
4. A maximum of 10% of the site area may be diverted from the peak flow compliance BMP due to topographic or other constraints.
5. Compliance with design storms other than the 2- and 100-year storm events is not required.
6. Undeveloped off-site flows are to be determined per the requirements of the SWDSM, rather than the Unit Rate.

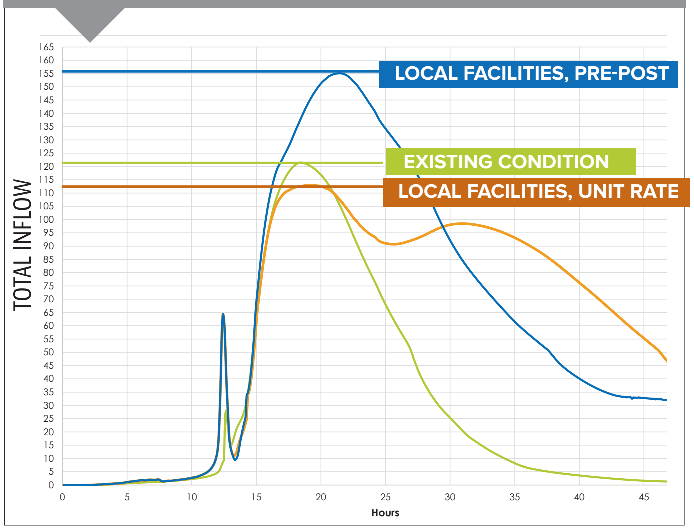


Information depicted may include data unverified by AE2S. Any reliance upon such data is at the user's own risk. AE2S does not warrant this map or its features are either spatially or temporally accurate.
Coordinate System: NAD 1983 StatePlane North Dakota South FIPS 3302 Feet Intl | Edited by: cwickenheiser | W:\Bismarck\00501-2015-013\GIS\Summary Brochure Figure.mxd
Elevations are in the North American Vertical Datum of 1988 (NAVD88).

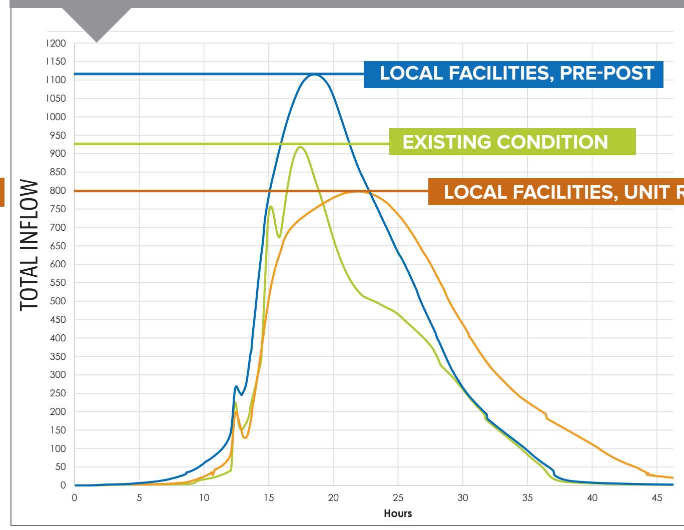
Why Unit Rate?

The Unit Rate Method combines the timing, funding, and flexibility benefits of the Local Facilities Approach with the watershed-wide performance and protection of downstream properties obtained with the Regional Facilities Approach.

2-YEAR STORM CONCEPT COMPARISON AT EAST MAIN AVE



100-YEAR STORM CONCEPT COMPARISON AT EAST MAIN AVE



Residential Sites						
	Conventional BMP		Unit Rate BMP		Increase	
Area (Acre)	Size of BMP (sq ft)	% of Site	Size of BMP (sq ft)	% of Site	Size of BMP (sq ft)	% of Site
40	53,300	3%	69,700	4%	17,400	1%
10	13,100	3%	19,600	4.5%	6,500	1.5%
1	1,700	4%	2,600	6%	900	2%

LOCAL FACILITIES, PRE-POST METHOD:

- Detention basins sized for a specific development
- Meets water quality and peak flow criteria at specific development boundary
- Does not reduce peak flow through out the watershed due to volume increases

REGIONAL FACILITIES, PRE-POST METHOD:

- Detention basins sized to detain flows from multiple developments
- Meets peak flow criteria at key locations in the watershed
- Peak flow criteria may not be met by each development area
- Typically Utilizes “Over-Detention” to Offset Volume Increases and Offset Impacts on a Watershed Scale

LOCAL FACILITIES, UNIT RATE

- Combination of local basin with regional focus
- Allowable release rate (cfs/acre) to address watershed challenges
- Larger Number of Smaller, Distributed Basins

	Local Pre-Post	Regional Pre-Post	Unit Rate
Meet Ordinance Criteria	X	X	X
Address Watershed Challenges		X	X
Match Pace of Development	X		X
Controls Stormwater Near the Source	X		X
Reduces Downstream Infrastructure Size	X		X
Minimize Number of Facilities to Maintain		X	
Water Quality Performance	X		X
Provides Development Flexibility	X		X
City-Led Projects		X	X