memo

Project Name |	MIDS Evaluation	**Date** |	Revised 06/26/2019
To / Contact info |	Karen Kill, Mike Isensee, MSCWMO and John Hanson, Barr Engineering Co.		
Cc / Contact info |			
From / Contact info |	Camilla Correll, PE; Mike Talbot, EIT		
Regarding |	Review of Task 1		

Goal of the MIDS Evaluation

To evaluate how adopting the Minimal Impact Design Standards (MIDS) in specific portions of the Brown's Creek watershed could affect downstream resources: specifically Long Lake, McKusick Lake and the St. Croix River. This memo defines the evaluation area, determines where new development/redevelopment is anticipated, and the likely applicable MIDS performance goal for each anticipated development.

This evaluation was conducted for the following two drainage areas:

- **Long Lake Drainage Area** – This area includes portions of the cities of Stillwater, Oak Park Heights, Lake Elmo and Stillwater Township.
- **Drainage Area to the Diversion Structure** – The drainage area to the Diversion Structure encompasses the Long Lake Drainage Area as well as the area between Long lake and the Diversion Structure east of Manning Avenie (County Road 15). This area also includes portions of the cities of Stillwater, Oak Park Heights, Lake Elmo and Stillwater Township. It should be noted that this drainage area does not include drainage west of County Road 15 in the City of Grant. Given that the request to consider MIDS for this portion of the watershed was brought up by the more developed communities concerned with implications to economic development along the Highway 36 corridor, the District limited the evaluation to these communities. Grants' desire to maintain rural development patterns means that there would likely be little to no development in this portion of the drainage area in the next 10 to 20 years. Additionally, the Trout Stream Mitigation Project (TSMP) Agreement Area does not apply to the City of Grant so there are no factors affecting the application of the District's rules.

Definitions

A quick definition or explanation of terms is provided to assist the reader with the terminology used for this evaluation.

Hydrologic Soil Groups (HSG) - A classification system based on the soil's capacity to convey and store water. HSG's are divided into four groups (USDA NRCS):

HSG A	Well drained sands and gravel, high infiltration capacity, high leaching potential and low runoff potential
HSG B	Moderately drained fine to coarse-grained soils, moderate infiltration capacity, moderate leaching potential and moderate runoff potential

HSG C Fine grained, low infiltration capacity, low leaching potential and high runoff potential

HSG D Clay soils, very low infiltration capacity, very low leaching potential and very high runoff potential

Emergency Response Area (ERA) - The part of the wellhead protection area that is defined by a one-year time of travel within the aquifer used by any given public water supply well (Minnesota Rules, part 4720.5250, subpart 3). It is used to set priorities for managing potential contamination sources within the DWSMA. This area is particularly relevant for assessing impacts from potential sources of pathogen contamination because this time of travel is believed to closely correspond with the survival period of many pathogens.

Drinking Water Supply Management Area (DWSMA) – The surface and subsurface area surrounding a public water supply well, including the wellhead protection area, that must be managed by the entity identified in a wellhead protection plan. This area is delineated using identifiable landmarks that reflect the scientifically calculated wellhead protection area boundaries as closely as possible.

Karst – A terrain having distinctive landforms and hydrology created primarily from the dissolution of soluble bedrock. In karst, water dissolves fractures and joints in the bedrock forming a network of interconnected underground conduits that can easily transport surface water to the groundwater system and carry groundwater long distances at speeds up to miles per day.

Assessment of Future Development Activity

Task 1 of the MIDS Evaluation was to "Determine how much of the evaluation areas would be subject to new development, redevelopment, infill, and road reconstruction/construction projects". This memorandum summarizes the work completed for this task.

The BCWD met with MnDOT, the City of Stillwater and the City of Oak Park Heights to identify where new development and/or redevelopment is expected to happen in the drainage areas to Long Lake and the Diversion Structure (Figure 1) within the foreseeable future (defined as the next 10 years). Information for Washington County was collected using the 2030 Comprehensive Plan and their 5-year Capital Improvement Plan. In addition to identifying the parcels expected to be developed and/or redeveloped, the cities identified which parcels would be developed under a single plan and how much impervious coverage would apply to the anticipated development activity.

Figure 1 identifies the individual parcels/roads expected to be developed/redeveloped and assigns an identification number to each development plan. In total, there are 19 development or redevelopment projects in the drainage area to Long Lake and 24 development or redevelopment projects in the drainage area to the Diversion Structure. Two of these projects are road improvement projects, both of which are located in both drainage areas: MNDOT's Highway 36 and Manning Avenue Interchange (Area #9) and the City of Oak Park Heights' frontage road reconstruction project (Area #10). There is also a portion of the Central Greenway Regional Trail that will likely be constructed in the City of Lake Elmo (Area #23).

A couple of assumptions were made for development plans located in the City of Stillwater. Within the commercial area located east of County Road 5 and north of Highway 36 (Area #22), the City anticipates that Herberger's a department store, which closed in 2018, will redevelop in the foreseeable future (Area #22a). This site occupies seven parcels and is located east of Washington Avenue between Tower Drive and the Frontage Road. Within this same commercial area, the City envisions some of the larger parking areas redeveloping into fast-food/drive-through businesses (as Dairy Queen did at Valley Ridge Mall). As a result, it was assumed that a similar sized development would occur within the parking lot at Target (Area #22b), which is located in Stillwater Market Place.

Additionally, it was assumed that ¼ of the individual parcels in Area #6 will redevelop at a slightly higher density.

Given these assumptions, 11% of the Long Lake drainage area and 13% of the drainage area to the Diversion Structure (as shown in Figure 1) would be subject to Rule 2.0 of the BCWD's Rules.

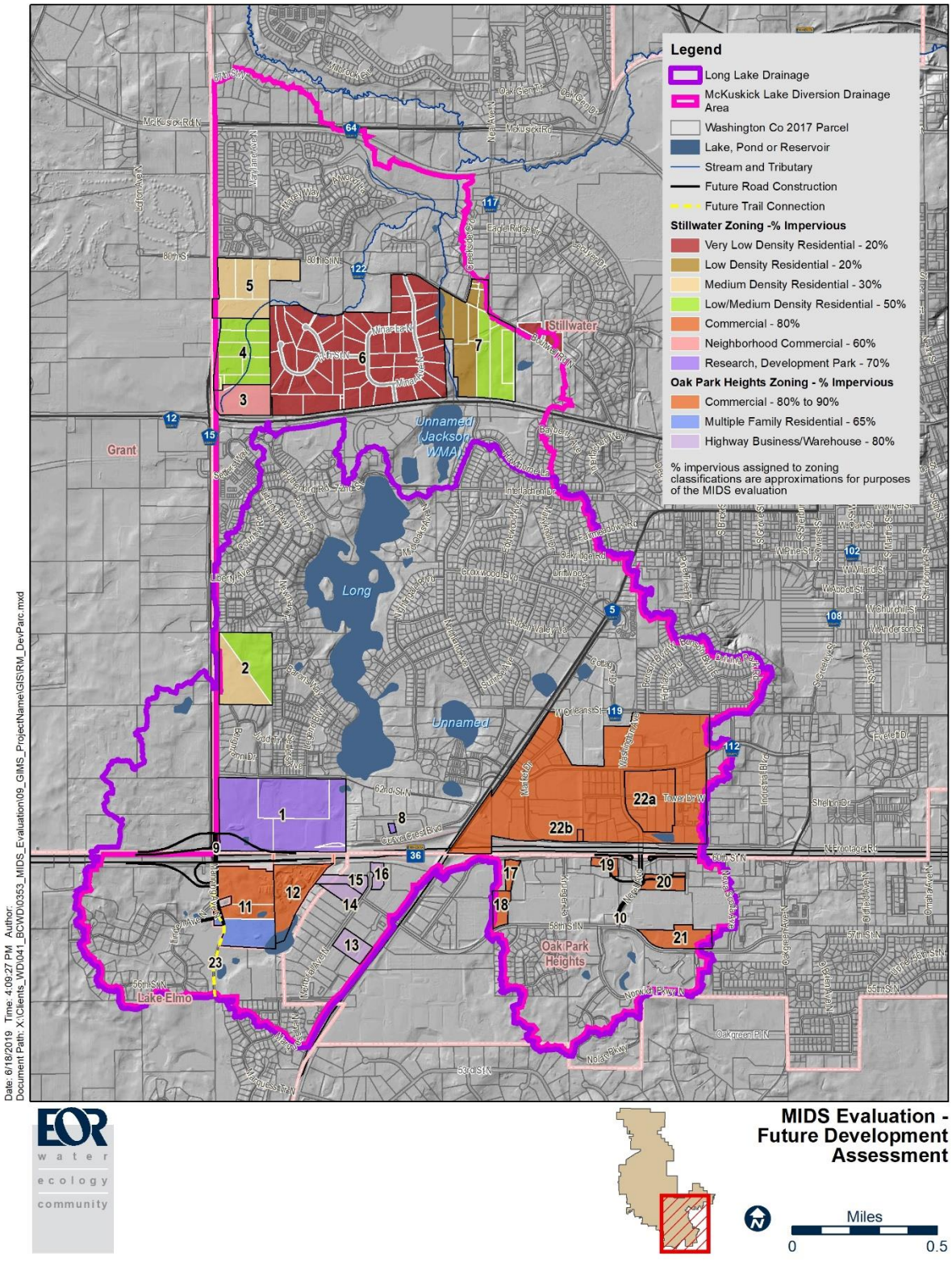

Figure 1. Areas identified for future development in the drainage areas to Long Lake and the Diversion Structure.

Application of the Minimal Impact Design Standards (MIDS)

After identifying which parcels/roads the member communities and MNDOT expect to develop/redevelop in the next 10 years, EOR evaluated how the location of these sites may be impacted by prohibitions identified in the National Pollutant Discharge Elimination System (NPDES) Construction Stormwater General Permit (July 31, 2018) or site restrictions which would allow the development to meet alternative MIDS performance goals (or what is referred to as Flexible Treatment Options).

It should be noted that three of the 24 development areas would not trigger the Construction Stormwater General Permit which has a trigger of one acre or more of land disturbance. Area # 8, Area #22b (fast-food/drive-through businesses in the Target parking lot) and Area #23 (regional trail) would likely fall below this threshold. Additionally, redevelopment activity in Area #6 may also fall below this threshold depending upon how these areas redevelop (individually or common plan of development). In all cases, development/redevelopment of these areas would trigger the BCWD's current rules (10,000 sq. ft. or more of imperviousness or 5,000 sq. ft. of imperviousness in the contributing drainage area of a groundwater dependent natural resource). It would also trigger the 6,000 sq. ft. threshold adopted by the Middle St. Croix WMO and the Valley Branch Watershed District (VBWD).

According to the NPDES Construction Stormwater General Permit, the construction of infiltration systems within a DWSMA is prohibited if the system will be located:

a. In an ERA within a DWSMA classified as having high or very high vulnerability; or
b. In an ERA within a DWSMA classified as moderate vulnerability unless a regulated MS4 Permittee performed or approved a higher level of engineering review sufficient to provide a functioning treatment system and to prevent adverse impacts to groundwater; or
c. Outside of an ERA within a DWSMA classified as having high or very high vulnerability, unless a regulated MS4 Permittee performed or approved a higher level of engineering review sufficient to provide a functioning treatment system and to prevent adverse impacts to groundwater.

While the BCWD rules do not currently include language restricting the use of infiltration in an ERA or DWSMA, the District is interested in applying its rules in a consistent fashion with the State of Minnesota and its member communities. In May 2019, the City of Stillwater adopted MIDS. According to the City's Engineering Design Guidelines, infiltration is precluded if the property is (1) within a Wellhead Emergency Response Area and (2) within a DWSMA with a moderate to high vulnerability. Recent permit applications located in the City of Oak Park Heights' DWSMA have not been allowed to use infiltration (or create new infiltration) to meet volume control requirements (e.g. Permit 18-11 Ridgecrest and Permit 18-08 Holiday Inn Express & Suites). As a result, it is assumed that both communities have limitations in the use of infiltration as a means of meeting the MIDS requirement or the BCWD rules and will continue to be a factor for consideration under the District's variance process. Specifically, the City of Stillwater prohibits the use of stormwater infiltration in the ERA and the City of Oak Park Heights prohibits infiltration in the DWSMA.

According to Minnesota Statute 115.03, Subd. 5c (c) "*The agency (MPCA) shall develop performance standards, design standards, or other tools to enable and promote the implementation of low impact*

development and other stormwater management techniques. For the purpose of this section, "low impact development" means an approach to stormwater management that mimics a site's natural hydrology as the landscape is developed. Using the low impact development approach, stormwater is managed on site and the rate and volume of predevelopment stormwater reaching receiving waters is unchanged. The calculation of predevelopment hydrology is based on native soil and vegetation."

In 2013, MIDS was released after a five-year long development process. While the MIDS performance goal for new development sites that do not have restrictions is the retention of 1.1 inches of runoff from imperious surfaces, there are different performance goals for redevelopment activity, linear projects and sites subject to conditions that may limit the use of infiltration. If site restrictions make it infeasible to meet the 1.1 inch performance goal, a 0.55 inch performance goal is explored, followed by a 60 percent annual Total Phosphorous removal goal, and then a final option of meeting the 1.1 inch volume reduction goal at an off-site location. To determine which performance goal would apply to the individual development plans identified in Figure 1, EOR evaluated which site restrictions would apply to each of the sites (see Table 1). As Table 1 indicates, the main factors influencing application of the performance goals are HSG D soils and the DWSMA. Figures 2 through 5 illustrate how these particular site restrictions affect the application of the BCWD rules and MIDS on the development plans. Specifically, Figures 2 and 3 identify where HSG D soils are located on the development plans and Figures 4 and 5 illustrate how the development plans are situated relative to the City of Stillwater's and Oak Park Heights' drinking water supply management areas (DWSMAs).

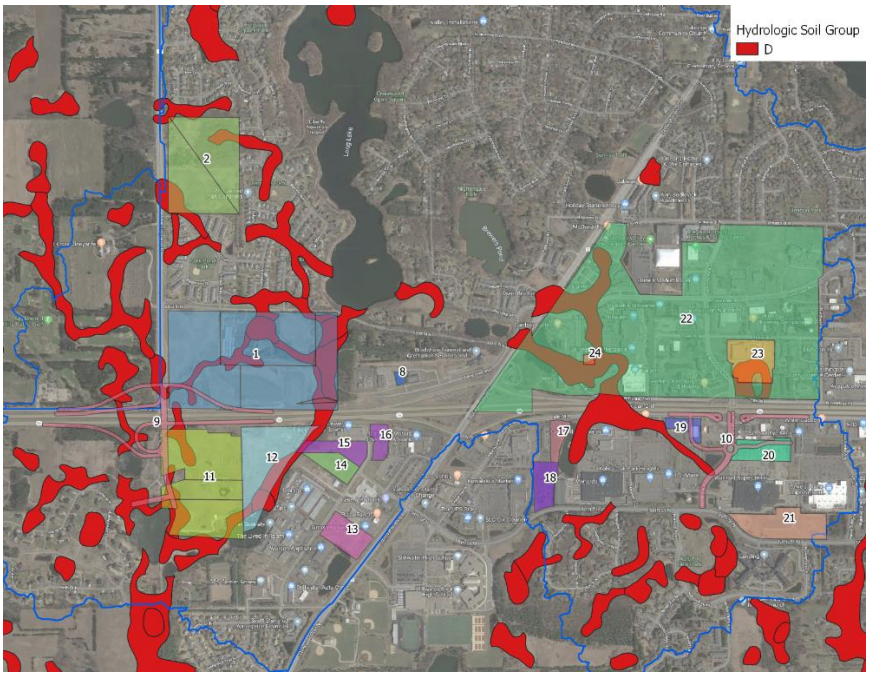

Figure 2. Location of HSG D soils within development areas in Long Lake Drainage Area

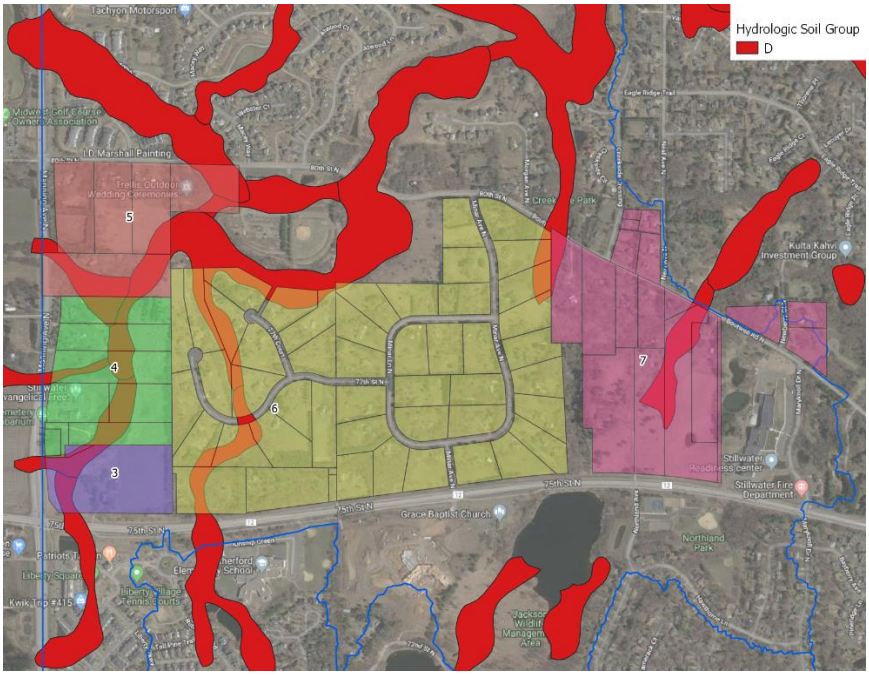

Figure 3. Location of HSG D soils within development areas in Drainage Area to Diversion Structure

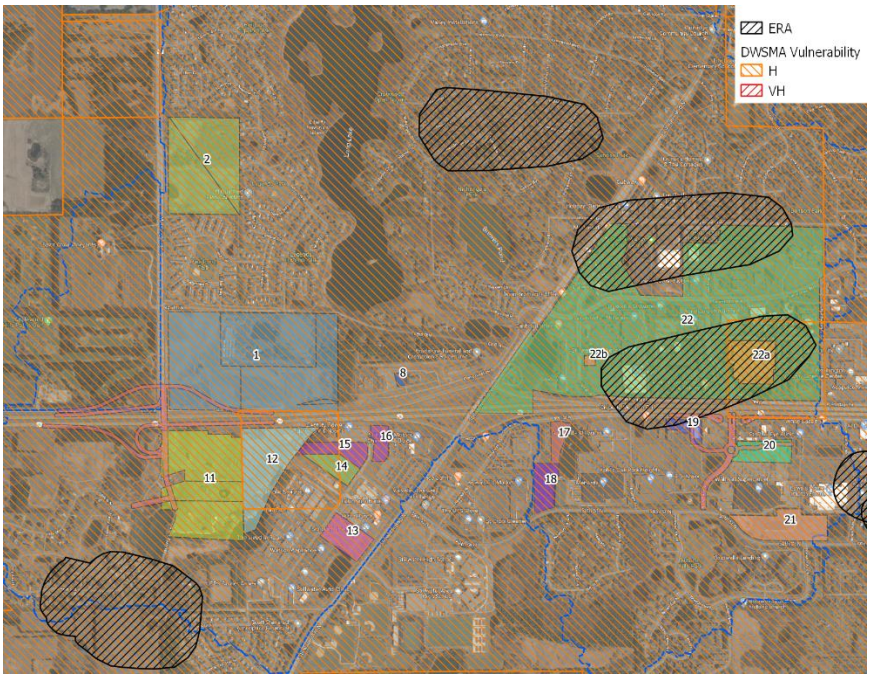

Figure 4. Location of development areas within DWSMA with high vulnerability in Long Lake drainage area

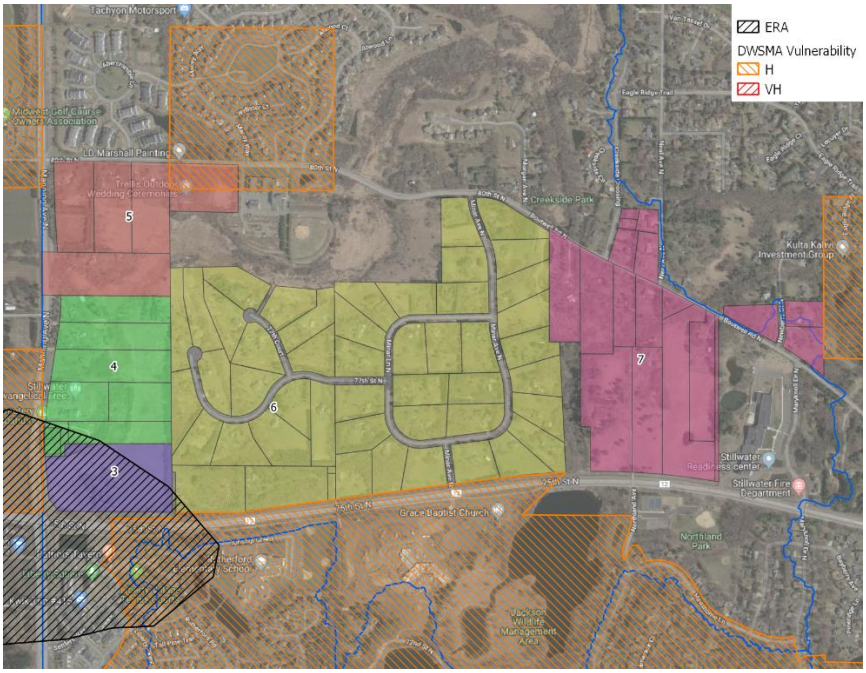

Figure 5. Location of development areas within DWSMA with high vulnerability in drainage area to the Diversion Structure

In addition to evaluating the site restrictions identified in the MIDS Design Sequence Flowchart – Flexible Treatment Options, EOR considered whether or not the development plans would be subject to existing agreements or regional treatment. The BCWD is a partner to two agreements, which exempt certain portions of the watershed from the District's volume control requirement: the TSMP Agreement and the Kern Center Pond Agreement (Figure 6). If a development plan falls within one of these two agreement areas, it is noted in the column titled "Other restrictions" in Table 1. Additionally, Area #8 falls in the Bradshaw Development, which implemented a stormwater management plan designed to retain runoff for all events up to the 100-year 24-hour rainfall event.

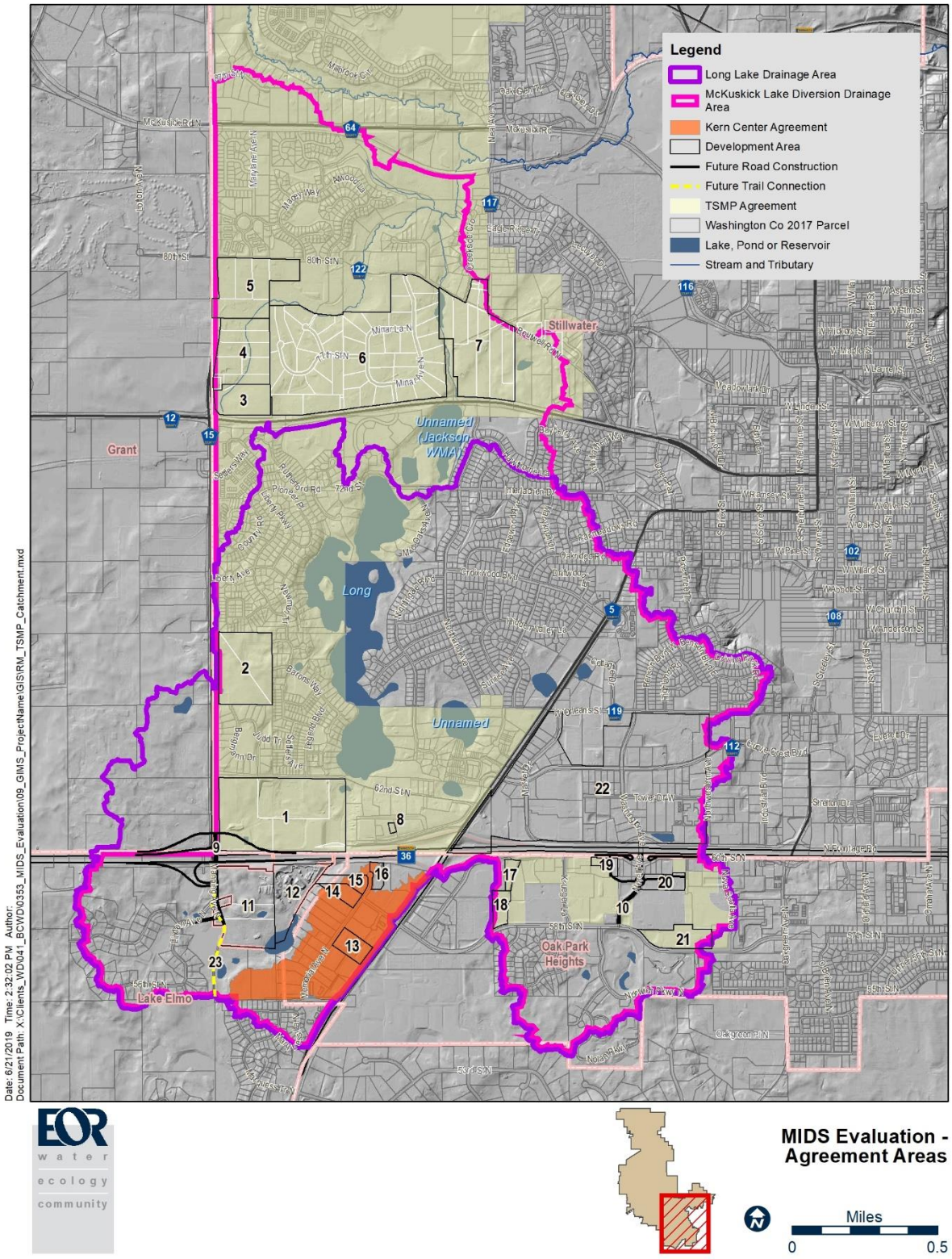

Figure 6. Portions of the drainage areas subject to TSMP and Kern Center Pond Agreements

After evaluating all of the site restrictions, EOR determined which of the MIDS requirements would apply to each of the development plans. This information is summarized in Table 2.

Table 1. Summary of site restrictions per development plan

Development Plan			Site Restrictions							
ID	Size [acres]	Imp. Area	D Soils	Soils w/ >8 iph	DWSMA	ERA [Y/N]	Karst	Shallow gw/ bedrock	Contaminated soils	Other restrictions
1	70.3	49.2	25%	None	100%	Y / N	None	TBD	None	TSMP Agreement
2	29.3	7.3	12%	None	100%	N	None	TBD	None	TSMP Agreement
3	12.5	7.5	20%	None	0%	Y	None	TBD	None	TSMP Agreement
4	27.1	6.8	25%	None	0%	N	None	TBD	None	TSMP Agreement
5	29.3	7.3	25%	None	9%	N	None	TBD	None	TSMP Agreement
6	31.9	9.6	8%	None	0%	N	None	TBD	None	TSMP Agreement
7	54.9	11.5	9%	None	0%	N	None	TBD	Potential	TSMP Agreement
8	0.5	0.3	0%	None	100%	N	None	TBD	None	None
9	14.4	14.4	20%	None	100%	N	None	TBD	Potential	Electric, Storm
10	7.4	7.4	1%	None	100%	N	None	TBD	Potential	Electric, Storm
11	34.3	25.7	19%	None	100%	N	None	TBD	None	None
12	17.2	13.8	23%	None	100%	N	None	TBD	None	Electric, Storm, Easement
13	5.5	4.4	0%	None	100%	N	None	TBD	None	Kern Center Agreement
14	3.7	3.0	0%	None	100%	N	None	TBD	None	Kern Center Agreement, Electric, Storm, Easement
15	4.2	3.4	8%	None	100%	N	None	TBD	None	Kern Center Agreement, Electric, Storm, Easement
16	2.4	1.9	0%	None	99%	N	None	TBD	None	Kern Center Agreement, Electric, Storm, Easement
17	2.3	1.8	0%	None	100%	N	None	TBD	None	TSMP Agreement, Electric, Storm, Easement

Development Plan			Site Restrictions							
ID	Size [acres]	Imp. Area	D Soils	Soils w/ >8 iph	DWSMA	ERA [Y/N]	Karst	Shallow gw/ bedrock	Contaminated soils	Other restrictions
18	4.3	3.4	0%	None	100%	N	None	TBD	None	TSMP Agreement, Electric, Storm, Easement
19	2.4	1.9	1%	None	100%	N	None	TBD	None	TSMP Agreement
20	5.2	4.2	0%	None	100%	N	None	TBD	None	Electric, Storm, Easement
21	9.9	7.9	0%	None	100%	N	None	TBD	None	TSMP Agreement
22a	8	6.4	36%	None	100%	Y	None	TBD	Potential	None
22b	0.5	0.4	36%	None	100%	N	None	TBD	Potential	None
23	0.6	0.6	50%	None	100%	N	None	TBD	None	None

Note: Linear projects highlighted in grey.

Using the Final MIDS Flow Chart, it was determined which of the MIDS performance goals would apply to the development plans identified by MNDOT and the communities. This information is summarized in Table 2.

Table 2. Summary of which MIDS performance goals apply to individual development plans

Develop. Plan	MIDS Performance Goal		Community	Allows Infiltration in DWSMA	Volume Goal	Water Quality Goal*
1	Full MIDS	Within the DWSMA and in a community that allows infiltration w/in the DWSMA: Retain on site a volume of 1.1" from impervious surfaces	Stillwater	Yes	1.1"	NA
2	Full MIDS		Stillwater	Yes	1.1"	NA
3	FTO 2	Within the ERA of a DWSMA: Community does not allow infiltration	Stillwater	No	Max. Extent Practicable	60% TP
4	Full MIDS	Outside of the DWSMA: Retain on site a volume of 1.1" from impervious surfaces	Stillwater	Yes	1.1"	NA
5	Full MIDS		Stillwater	Yes	1.1"	NA
6	Full MIDS		Stillwater	Yes	1.1"	NA
7	Full MIDS		Stillwater	Yes	1.1"	NA
8	Full MIDS	Within the DWSMA and in a community that allows infiltration w/in the DWSMA: Retain on site a volume of 1.1" from impervious surfaces	Stillwater	Yes	1.1"	NA
9	FTO 1	Goal for Linear Project: 0.55 inches of runoff from the new and fully reconstructed impervious surfaces	Stillwater/Lake Elmo/Grant	Yes	0.55"	75% TP
10	FTO 1		Oak Park Heights	No	0.55"	75% TP
11**	Full MIDS	Within the DWSMA and in a community that allows infiltration w/in the DWSMA: Retain on site a volume of 1.1" from impervious surfaces	Stillwater	Yes	1.1"	NA
12**	Full MIDS		Stillwater	Yes	1.1"	NA

Develop. Plan	MIDS Performance Goal		Community	Allows Infiltration in DWSMA	Volume Goal	Water Quality Goal*
13	FTO 2	Within the DWSMA and in a community that does not allow infiltration w/in the DWSMA 2.a. Achieve volume reduction to the maximum extent practicable (as determined by the Local Authority), and 2.b.*Remove 60%* of the annual TP load	Oak Park Heights	No	Max. Extent Practicable	60% TP
14	FTO 2		Oak Park Heights	No	Max. Extent Practicable	60% TP
15	FTO 2		Oak Park Heights	No	Max. Extent Practicable	60% TP
16	FTO 2		Oak Park Heights	No	Max. Extent Practicable	60% TP
17	FTO 2		Oak Park Heights	No	Max. Extent Practicable	60% TP
18	FTO 2		Oak Park Heights	No	Max. Extent Practicable	60% TP
19	FTO 2		Oak Park Heights	No	Max. Extent Practicable	60% TP
20	FTO 2		Oak Park Heights	No	Max. Extent Practicable	60% TP
21	FTO 2		Oak Park Heights	No	Max. Extent Practicable	60% TP
22a	FTO 2	Within the ERA of a DWSMA: Community does not allow infiltration	Stillwater	No	Max. Extent Practicable	60% TP
22b	Full MIDS	Within the DWSMA and in a community that allows infiltration w/in the DWSMA: Retain on site a volume of 1.1" from impervious surfaces	Stillwater	Yes	1.1"	NA
23	Full MIDS	Goal for Linear Project: 1.1 inches of runoff from the net increase in impervious area	Stillwater/Lake Elmo	Yes	1.1"	NA

Note: Linear projects highlighted in grey.

* The water quality goal for full application of MIDS is retaining the volume from 1.1" of impervious surfaces, which equates to approximately 90% TP and TSS removal over the course of an average year.

** While Development Areas #11 and #12 are located in the Stillwater TWP, conversations with the Cities of Stillwater and Oak Park Heights indicate that this property will likely fall within the City of Stillwater's jurisdiction.

Conclusions

As this memorandum describes, the main site restrictions driving the application of the BCWD rules and MIDS performance goals are (1) the Emergency Response Area (ERA) and/or Drinking Water Supply Management Area (DWSMA) and (2) existing agreements, which exempt development from portions of the District's volume control requirement.

The following flow charts illustrate how these restrictions affect the application of MIDS and the BCWD rules. Figure 7 illustrates how a site's location in a DWSMA (classified as having high vulnerability) and in the ERA, determine which MIDS performance goal a site has to meet: Full MIDS or Flexible Treatment Option 2.

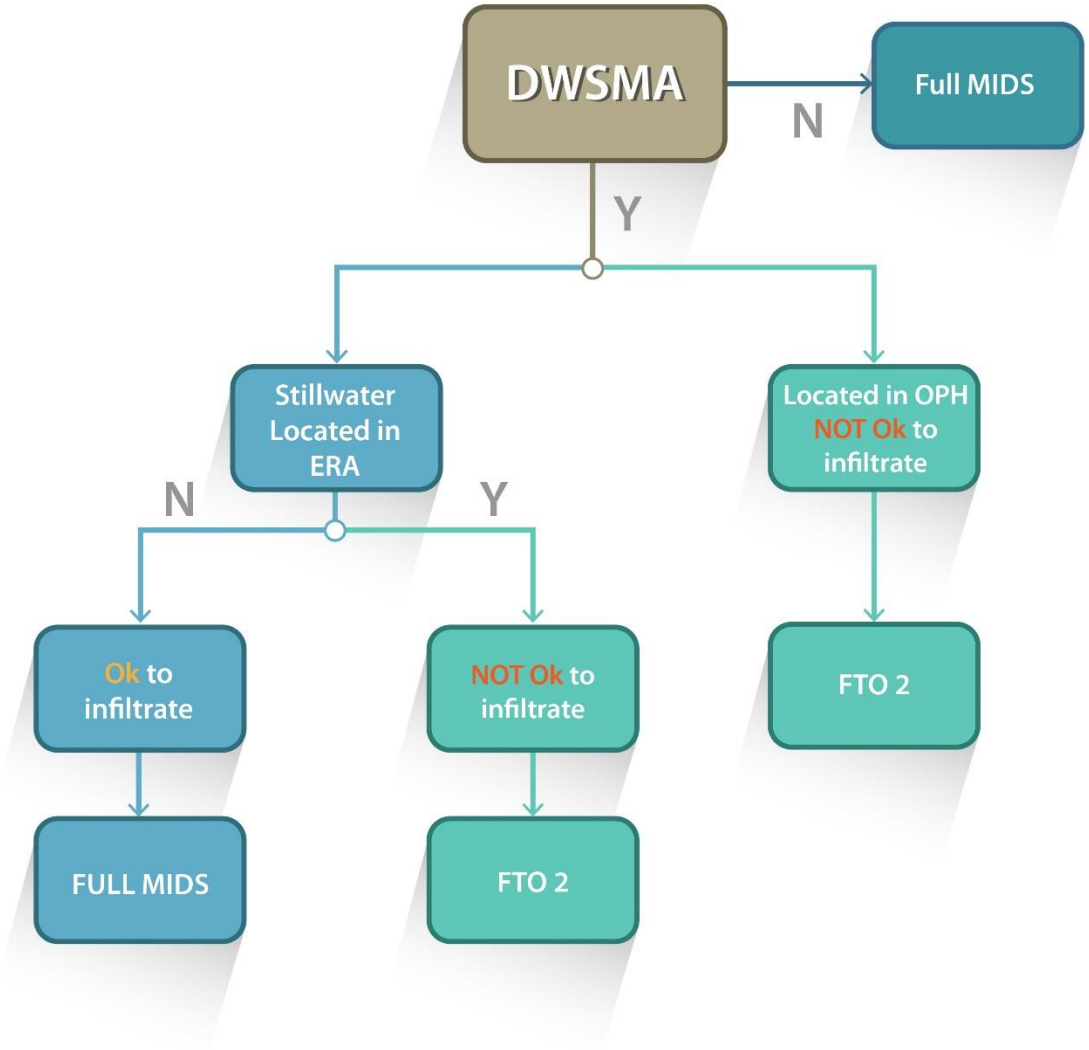

Figure 7. Flow chart illustrating how location within DWSMA affects the application of MIDS

Figure 8 illustrates how a site's location in an agreement area (TSMP or Kern Center), determines which BCWD volume control requirement a site has to meet: 2018 rules, difference between the 2018 and 2000 rules, or no additional treatment required because regional treatment has already been approved under an existing permit.

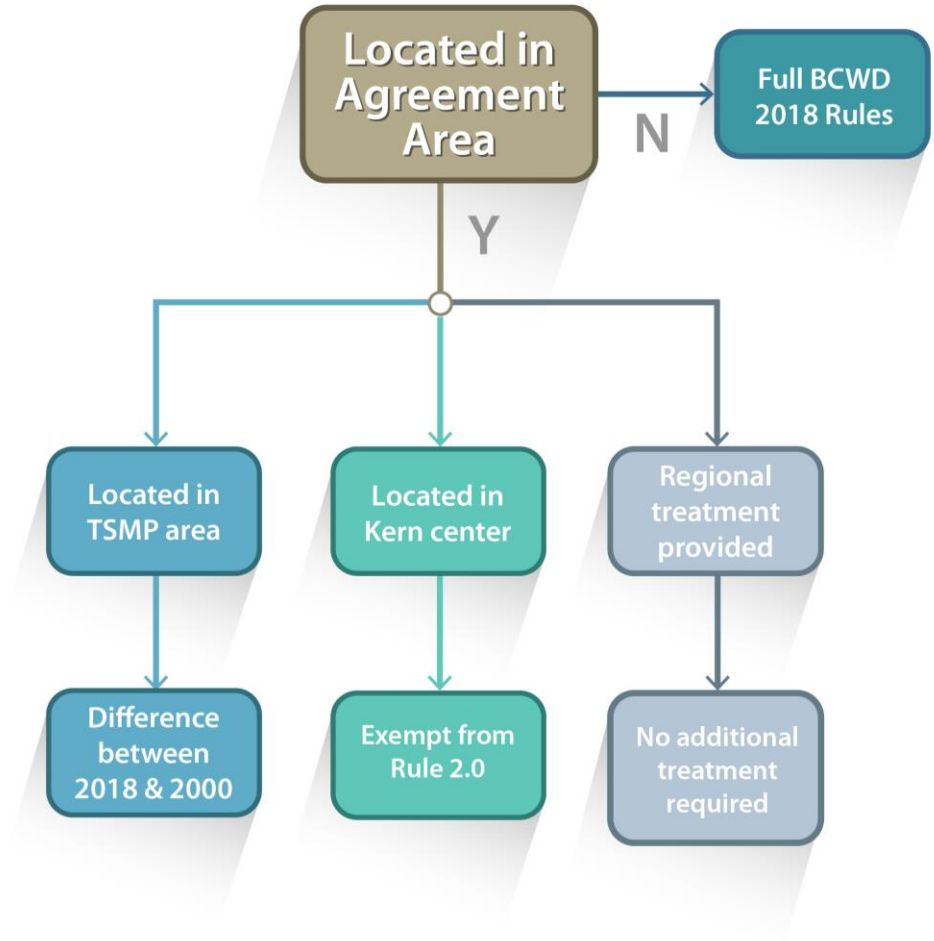

Figure 8. Flow chart illustrating how location within existing agreement area impacts the application of BCWD rules

Table 3 summarizes how all of these factors play out in the project area and identifies which MIDS Performance Goal and BCWD rule requirement applies to each individual development area given its proximity to site restrictions and agreement areas. It should be noted that the MIDS requirement for linear projects is not reflected in Table 3 but was taken into account in the comparison of volume control requirements and water quality treatment. Figure 9 summarizes the same information in a visual format.

Table 3. Tabular summary of how MIDS Performance Goals and BCWD rules apply to development areas

Proximity to Existing Agreement Area/Regional Treatment	Proximity to Drinking Water Supply Management Area (DWSMA)				
		Stillwater in Emergency Response Area (ERA)	***Stillwater in DWSMA***	***Stillwater not in DWSMA***	***OPH DWSMA***
	Stillwater in TSMP Agreement Area	Area 3v 	Areas 1, 2 	Areas 4, 5, 6, 7 	
	Stillwater Outside of TSMP Agreement Area	Area 22a 	Areas 9, 11, 12, 22b, 23 		
	OPH in TSMP Agreement Area				Areas 17, 18, 19, 21 
	OPH Outside of TSMP Agreement Area				Areas 20, 10 
	Kern Center Agreement Area				Areas 13, 14, 15, 16 
	Bradshaw Development		Area 8 		

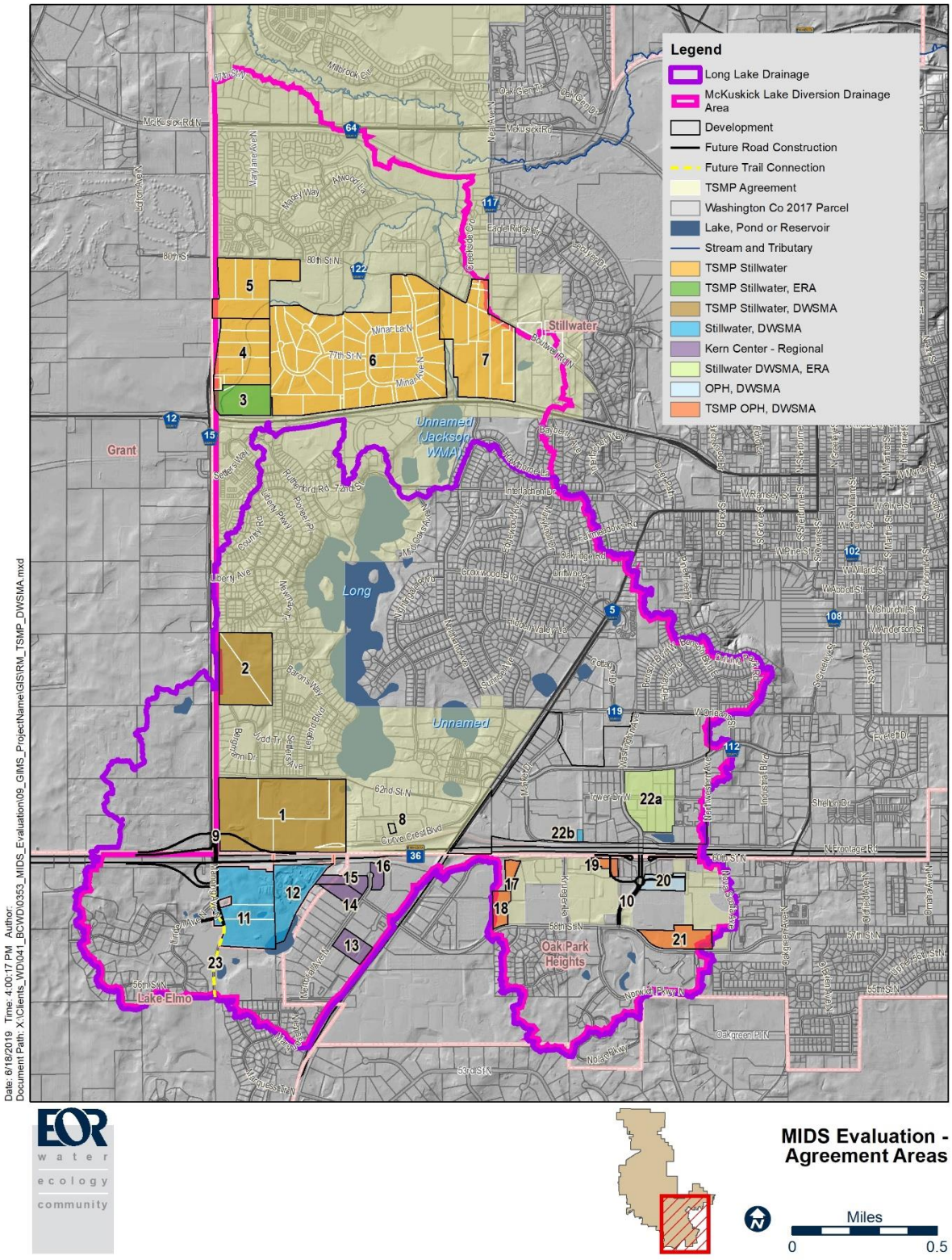

Figure 9. Graphical summary of how MIDS Performance Goals and BCWD rules apply to development areas

memo

Project Name |	MIDS Evaluation	**Date** |	06/19/2019
To / Contact info |	Karen Kill, Mike Isensee, MSCWMO and John Hanson, Barr Engineering Co.		
Cc / Contact info |			
From / Contact info |	Camilla Correll, PE; Cecilio Olivier, PE; Mike Talbot, EIT		
Regarding |	Review of Tasks 2 and 3		

Goal of the MIDS Evaluation

To evaluate how adopting MIDS in specific portions of the watershed will affect downstream resources: specifically Long Lake, McKusick Lake and the St. Croix River. This memo builds off the Task 1 memo by describing the steps taken to calculate the volume of stormwater runoff that would need to be mitigated under MIDS and the BCWD rules (Task 2) and how much water quality treatment would be provided by the application of each rule in this portion of the watershed (Task 3).

As the Task 1 memo articulates, there is significant variation in the application of the MIDS Performance Goals and the BCWD rules in this portion of the watershed due to the following factors:

- Application of the TSMP Agreement and the Kern Center Agreement;
- Location of a Drinking Water Supply Management Area (DWSMA) classified as having high vulnerability; and
- Differences in how the cities of Stillwater and Oak Park Heights allow the use of stormwater infiltration in the DWSMA (i.e. Stillwater prohibits the use of infiltration within the ERA and allows it in the rest of the DWSMA while Oak Park Heights prohibits the use of infiltration in the entire DWSMA).

At the end of this memorandum, EOR summarizes the overall findings of this evaluation.

Comparison of Volume Requirements

Task 2 of the MIDS Evaluation was to "calculate the volume of stormwater runoff that needs to be retained under the BCWD rules and MIDS". Using the assessment of future development (specifically Figure 9 of Task 1), EOR performed calculations to determine how much volume needs to be retained on site for each development area (see Table 1) for MIDS and the BCWD rules. These calculations were performed using the District's PCSWMM model which allows for event-based comparisons, meaning that pre-development and post-development runoff volumes can be determined for the 24-hour rainfall events prescribed by the rules. Since the MIDS Calculator generates results on an annual basis, it could not be used for the comparison of volume requirements. A description of the main parameters and assumptions used in the modeling analysis can be requested from the BCWD.

As Table 1 demonstrates, MIDS provides more volume control than the BCWD's rules (for the entire drainage area to the Diversion Structure) due to all of the site restrictions and exemptions to the BCWD rules that apply in this portion of the watershed. The total amount of stormwater runoff retained using the MIDS Performance Goals is higher than that retained using the BCWD's rules: 15.45 acre-feet of runoff retained versus 11.57 acre-feet of runoff (a difference of 3.9 acre-feet).

Table 1 also shows the differences in volume retained within the Long Lake drainage area. Again the total amount of stormwater runoff retained using the MIDS Performance Goals is higher than that retained by the BCWD rules: 10.74 acre-feet of runoff retained versus 10.39 acre-feet of runoff (a difference of 0.35 acre-feet).

A couple of assumptions were made in this analysis that require explanation:

- The MIDS analysis assumes that a permit applicant can achieve 25% of the Full MIDS Performance Goal (1.1") when Flexible Treatment Option 2 applies to the site. "Maximum Extent Practicable" was assumed to be ¼ of the Full MIDS requirement based upon a review of recent permit applications approved in this portion of the watershed.
- Where a development area is located in the ERA or DWSMA and we know NPDES and the cities won't allow stormwater infiltration, we applied the full volume control requirement whether it's the 2018 volume control standard or the difference between the 2018 and 2000 standards. Because the rules do not currently include off-ramps or flexible treatment options, a permit applicant will be required to request a variance from the volume control standard if alternative means of volume control (e.g. green roofs, tree trenches, stormwater reuse) cannot achieve the full requirement.

While the City of Stillwater is comfortable with the use of stormwater infiltration in a DWSMA classified as having high vulnerability, they have not performed the engineering review as required by the NPDES Construction Stormwater General Permit. Shawn Sanders, Stillwater Public Works Director has indicated that the City would be interested in partnering on the development of this engineering review.

Table 1. Summary of volume control requirements for MIDS and BCWD rules

Develop. Area	Community	Allows Infiltration in DWSMA	Located in Agreement Area [TSMP/Kern]	MIDS Volume Goal	BCWD Volume Requirement	MIDS Volume [AF]	BCWD Volume [AF]
1	Stillwater	Yes	TSMP	1.1”	Difference 2018 & 2000	4.51	0.48
2	Stillwater	Yes	TSMP	1.1”	Difference 2018 & 2000	1.07	0.27
3	Stillwater	No - ERA	TSMP	FTO 2	Difference 2018 & 2000	0.17	0.08
4	Stillwater	Yes	TSMP	1.1”	Difference 2018 & 2000	1.24	0.16
5	Stillwater	Yes	TSMP	1.1”	Difference 2018 & 2000	0.81	0.17
6	Stillwater	Yes	TSMP	1.1”	Difference 2018 & 2000	0.73	0.26
7	Stillwater	Yes	TSMP	1.1”	Difference 2018 & 2000	1.76	0.50
8	Stillwater	Yes	Bradshaw	NA – Regional Treatment	NA - Regional Treatment	NA	NA
9	Stillwater/Lake Elmo/Grant	Yes	No	0.55”	2018 Rules	0.66	1.15
10	Oak Park Heights	No	No	0.55”	2018 Rules	0.17	0.37
11	Stillwater TWP	Yes	No	1.1”	2018 Rules	2.35	4.09
12	Stillwater TWP	Yes	No	1.1”	2018 Rules	1.26	2.08
13	Oak Park Heights	No	Kern	NA – Regional Treatment	NA - Regional Treatment	NA	NA
14	Oak Park Heights	No	Kern	NA – Regional Treatment	NA - Regional Treatment	NA	NA
15	Oak Park Heights	No	Kern	NA – Regional Treatment	NA - Regional Treatment	NA	NA
16	Oak Park Heights	No	Kern	NA – Regional Treatment	NA - Regional Treatment	NA	NA

Develop. Area	Community	Allows Infiltration in DWSMA	Located in Agreement Area [TSMP/Kern]	MIDS Volume Goal	BCWD Volume Requirement	MIDS Volume [AF]	BCWD Volume [AF]
17	Oak Park Heights	No	TSMP	FTO 2 Max. Extent Practicable (assumes 25% volume control)	Difference 2018 & 2000	0.04	0.03
18	Oak Park Heights	No	TSMP	FTO 2 Max. Extent Practicable (assumes 25% volume control)	Difference 2018 & 2000	0.08	0.04
19	Oak Park Heights	No	TSMP	FTO 2 Max. Extent Practicable (assumes 25% volume control)	Difference 2018 & 2000	0.04	0.02
20	Oak Park Heights	No	No	FTO 2 Max. Extent Practicable (assumes 25% volume control)	2018 Rules	0.10	0.72
21	Oak Park Heights	No	TSMP	FTO 2 Max. Extent Practicable (assumes 25% volume control)	Difference 2018 & 2000	0.18	0.07
22a	Stillwater	No – ERA	No	FTO 2 Max. Extent Practicable (assumes 25% volume control)	2018 Rules	0.15	1.01
22b	Stillwater	Yes	No	1.1”	2018 Rules	0.03	0.05
23	Stillwater/Lake Elmo	Yes	No	1.1”	NA – Project size does not trigger Rule	0.05	0.08
TOTAL VOLUME RETAINED *(Drainage Area to the Diversion Structure)*						**15.45**	**11.57**
TOTAL VOLUME RETAINED *(Drainage Area to Long Lake)*						**10.74**	**10.39**

Comparison of Water Quality Requirements

Task 3 of the MIDS Evaluation was to "compare how much water quality treatment is required for MIDS and the BCWD rules". Again, information regarding site restrictions (summarized in the Task 1memo) informs the level of water quality treatment provided by MIDS (the application of Full MIDS results in higher water quality treatment than the Flexible Treatment Options). Since the BCWD's water quality requirement is a stand-alone rule (independent of the volume control requirement), it is not affected by site restrictions that preclude the use of infiltration or result in a lower volume control requirement. Since the application of District's volume control requirement typically results in meeting or exceeding the District's water quality requirement, this volume retention is also evaluated as part of the water quality comparison.

In order to perform an apples-to-apples comparison of the level of treatment provided by both standards, EOR used the MIDS Calculator, which allows for the comparison of annual total phosphorous (TP) loads. Table 2 identifies the annual % TP removal and TP load removed for MIDS, the BCWD volume control standard, and the BCWD water quality standard.

As Table 2 demonstrates, the water quality treatment provided by MIDS and the BCWD rules is comparable in the drainage area to the Diversion Structure. The total amount of annual TP loads retained using the MIDS Performance Goals is higher than that retained using the BCWD's rules: 348.6 lbs/yr TP retained versus 338.2 lbs/yr TP (a difference of 10.4 lbs/yr TP or 3%). Where we see a discrepancy in the level of treatment is when we compare the numbers for the Long Lake Drainage Area. In this case the total amount of annual TP loads retained using the BCWD rules is 234,3 lbs/yr versus 225.5 lbs/yr being retained by MIDS. This 8.8 lb/yr difference equates to a 4% difference in treatment between the BCWD rules and MIDS.

If the BCWD Board of Managers approved any variances in the drainage are to Long Lake, the level of treatment provided by the BCWD rules would decreasing, bringing the level of treatment more in line with MIDS.

Table 2. Summary of water quality requirements for MIDS and BCWD rules

Develop. Area	MIDS Performance Goal	BCWD Volume Control Requirement	BCWD Water Quality Requirement	MIDS Approximate WQ Treatment		BCWD WQ Treatment Provided by Volume Control		BCWD WQ Treatment Required by Rule	
				% Removal	Load Removed [lbs/yr]	% Removal	Load Removed [lbs/yr]	% Removal	Load Removed [lbs/yr]
1	Full MIDS	Difference 2018 & 2000	Match annual pre-development TP load	92%	79.9	27%	23.1	76%	66.3
2	Full MIDS	Difference 2018 & 2000	Match annual pre-development TP load	89%	26.9	49%	14.9	78%	26.2
3	FTO 2	Difference 2018 & 2000	Match annual pre-development TP load	60%	10.2	29%	4.9	80%	13.5
4	Full MIDS	Difference 2018 & 2000	Match annual pre-development TP load	90%	29.6	29%	9.6	77%	25.0
5	Full MIDS	Difference 2018 & 2000	Match annual pre-development TP load	87%	19.0	40%	8.9	63%	13.7
6	Full MIDS	Difference 2018 & 2000	Match annual pre-development TP load	83%	17.8	54%	11.6	61%	13.0

Develop. Area	MIDS Performance Goal	BCWD Volume Control Requirement	BCWD Water Quality Requirement	MIDS Approximate WQ Treatment		BCWD WQ Treatment Provided by Volume Control		BCWD WQ Treatment Required by Rule	
				% Removal	Load Removed [lbs/yr]	% Removal	Load Removed [lbs/yr]	% Removal	Load Removed [lbs/yr]
7	Full MIDS	Difference 2018 & 2000	Match annual pre-development TP load	88%	46.6	52%	27.5	73%	38.6
8	NA – Regional Treatment	NA – Regional Treatment	NA – Regional Treatment	NA	NA	NA	NA	NA	NA
9	FTO 1	2018 Rules	Match annual pre-development TP load	75%	17.0	91%	20.5	91%*	20.5*
10	FTO 1	2018 Rules	Match annual pre-development TP load	75%	8.8	77%	9.2	83%	10.0
11	Full MIDS	2018 Rules	Match annual pre-development TP load	92%	45.3	98%	48.4	98%*	48.4*
12	Full MIDS	2018 Rules	Match annual pre-development TP load	92%	21.6	98%	23.0	98%*	23.0*
13	NA – Regional Treatment	NA – Regional Treatment	NA – Regional Treatment	NA	NA	NA	NA	NA	NA
14	NA – Regional Treatment	NA – Regional Treatment	NA – Regional Treatment	NA	NA	NA	NA	NA	NA

Develop. Area	MIDS Performance Goal	BCWD Volume Control Requirement	BCWD Water Quality Requirement	MIDS Approximate WQ Treatment		BCWD WQ Treatment Provided by Volume Control		BCWD WQ Treatment Required by Rule	
				% Removal	Load Removed [lbs/yr]	% Removal	Load Removed [lbs/yr]	% Removal	Load Removed [lbs/yr]
15	NA – Regional Treatment	NA – Regional Treatment	NA – Regional Treatment	NA	NA	NA	NA	NA	NA
16	NA – Regional Treatment	NA – Regional Treatment	NA – Regional Treatment	NA	NA	NA	NA	NA	NA
17	FTO 2	Difference 2018 & 2000	Match annual pre-development TP load	60%	1.9	40%	1.3	85%	2.7
18	FTO 2	Difference 2018 & 2000	Match annual pre-development TP load	60%	3.4	32%	1.8	81%	4.7
19	FTO 2	Difference 2018 & 2000	Match annual pre-development TP load	60%	1.9	29%	0.9	80%	2.6
20	FTO 2	2018 Rules	Match annual pre-development TP load	60%	4.3	98%	7.0	98%*	7.0*
21	FTO 2	Difference 2018 & 2000	Match annual pre-development TP load	60%	8.1	25%	3.3	81%	10.8

Develop. Area	MIDS Performance Goal	BCWD Volume Control Requirement	BCWD Water Quality Requirement	MIDS Approximate WQ Treatment		BCWD WQ Treatment Provided by Volume Control		BCWD WQ Treatment Required by Rule	
				% Removal	Load Removed [lbs/yr]	% Removal	Load Removed [lbs/yr]	% Removal	Load Removed [lbs/yr]
22a	FTO 2	2018 Rules	Match annual pre-development TP load	60%	6.5	98%	10.6	98%*	10.6*
22b	Full MIDS	2018 Rules	Match annual pre-development TP load	88%	0.8	96%	0.7	96%*	0.7*
23	Full MIDS	NA – Below threshold for linear project	Match annual pre-development TP load	91%	0.9	0%	0.0	81%	0.8
TOTAL LOAD REMOVED *(Drainage Area to the Diversion Structure)*					**348.6**		**227.1**		**338.2**
TOTAL LOAD REMOVED *(Drainage Area to Long Lake)*					**225.5**		**164.7**		**234.3**

***** Sites where the full BWD rule requirement was applied even though the site falls in an area where stormwater infiltration is prohibited by NDPES and the community (i.e. site may be subject to a variance from the full volume control requirement).

Conclusions

The results of this evaluation demonstrate that the application of MIDS in both the Long Lake Drainage Area and the drainage area to the Diversion Structure is comparable (and in some cases higher) to the level of treatment provided by the BCWD rules. As a result, the same level of protection for downstream resources should be provided by MIDS.

This finding is based solely on the fact that there are numerous overlapping site restrictions and agreements with the cities of Stillwater and Oak Park Heights, which limit the application of the BCWD rules. If the District's 2018 volume control requirement could be applied to all development areas, a higher level of water quality treatment would be provided. Therefore, the results of this analysis cannot be extrapolated to the rest of the Brown's Creek watershed.

August 1, 2019

Karen Kill
Administrator
Brown's Creek Watershed District
455 Hayward Avenue North
Oakdale, MN 55128

Re: Rules Comparison

Dear Karen:

We have completed our tasks related to reviewing the Brown's Creek Watershed District's (BCWD's) efforts to compare its stormwater volume control rules to the performance goals of the Valley Branch Watershed District (VBWD) and Middle St. Croix Watershed District Management Organization (MSCWMO).

Per our scope, we:

- Attended three meetings, one conference call, and the BCWD's special meeting (John Hanson only)
- Reviewed project understanding and scope
- Communicated to BCWD the VBWD stormwater rule, as related to Minimal Impact Design Standards (MIDS) (John Hanson)
- Communicated to BCWD the MSCWMO stormwater rule, as related to MIDS (Mike Isensee)
- Reviewed analyses to check that MIDS and flexible treatment options were applied appropriately
- Reviewed results of analysis to check that they seemed reasonable

Thank you for inviting us to participate in your efforts.

Sincerely,

John P. Hanson, PE
Barr Engineering Co.
Engineer for the VBWD

Mikael Isensee
Former Administrator of the MSCWMO