

**AGENDA  
CASCADE CHARTER TOWNSHIP  
REGULAR BOARD MEETING**

Wednesday, November 14, 2018

7:00 P.M.

Cascade Branch of the Kent District Library, Wisner Center  
2870 Jacksmith, S.E.

**Expected Meeting Procedures**

1. During public comments you may speak on any item not noted on the agenda for a public hearing.
2. Please limit comments to 3 minutes per person and the Board may or may not choose to respond.
3. Please limit your comments to a specific issue.
4. Please turn OFF cellular phones.

**Article 1. Call to Order, Roll Call**

**Article 2. Pledge of Allegiance to the Flag**

**Article 3. Approval of Agenda**

**Article 4. Presentations**

**Article 5. Public Comments-Anything on the Agenda not scheduled for a public hearing. (limit comments to 3 minutes)**

**Article 6. Approval of Consent Agenda**

- a. Receive and File Various Meeting Minutes
  1. Regular Board Meeting Minutes 10/10/18 and 10/24/18.
- b. Receive and File Reports
  1. Building Department Monthly Report for October, 2018.
  2. Treasurer's Department Monthly Reports for May, June 2018.
  3. Kent County Sheriff's Department Quarterly Report.
- c. Receive and File Communications
  1. Letter from Grand Valley Metro Council – re: Thank you
  2. Letter to Grand Rapids City Commission – re: Medical Marijuana Ordinance Buffers.
  3. Letter from State of Michigan – re: Uniform Video Services Local Franchise Act.

**Article 7. Financial Actions**

**Article 8. Unfinished Business**

**Article 9. New Business**

**079-2018 Consider Approval of Revised Resolution to Approve the Levy for the 2018 Millage Rates. (roll call)**

**080-2018 Consider Approval of Cascade Charter Township Stormwater Master Plan.**

**081-2018      Consider Approval of Resolution Adopting the Hazard  
Mitigation Plan for Kent and Ottawa Counties. (roll call)**

**Article 10.      Public Comments – Any comments...whether it is on the Agenda or not.  
(limit comments to 3 minutes)**

**Article 11.      Manager Comments**

**Article 12.      Board Member Comments**

**Article 13.      Adjournment**

**MINUTES OF THE  
CASCADE CHARTER TOWNSHIP  
REGULAR BOARD MEETING**

Wednesday, October 10, 2018

7:00 P.M.

**Article 1.** Supervisor Beahan called the meeting to order  
Present: Supervisor Beahan, Clerk Slater, Treasurer Peirce, Trustees Koessel, McDonald, Lewis and Shipley.  
Absent: None  
Also Present: Manager Swayze, Community Development Director Peterson and those listed on Supplement #1.

**Article 2.** Supervisor Beahan led the Pledge of Allegiance to the Flag.

**Article 3.** Motion was made by Trustee Lewis and supported by Trustee Shipley to approve the Agenda as presented. Motion carried unanimously.

**Article 4. Presentations**

**Article 5. Public Comments-Anything on the Agenda not scheduled for a public hearing. (limit comments to 3 minutes)**

**Article 6. Approval of Consent Agenda**

- a. Receive and File Various Meeting Minutes
  - 1. Regular Township Board Minutes for 9/12/18 and 9/26/18.
  - 2. Regular Planning Commission Minutes for 9/17/18.
- b. Receive and File Reports
  - 1. Building Department Monthly Report for September, 2018.
- c. Receive and File Communication
  - 1. Letter from Evelyn C. Desjardin – re: Dumping of Industrial Waste Products by Bradford White into the Thornapple River.
  - 2. Letter from Charter Communications - re: Pricing adjustments.
  - 3. Notice from the Kent County Drain Commissioner – re: Notice of Meeting of Board of Determination – Oatman Drain.

Motion was made by Trustee Koessel and supported by Trustee Shipley to approve the Consent Agenda as presented. Motion carried unanimously.

**Article 7. Financial Actions**

- a. **Consider Approval of September 2018 General and Special Fund Financial Reports.**

Motion was made by Trustee McDonald and supported by Trustee Koessel to approve the September 2018 General and Special Fund Financial Reports. Motion carried unanimously.

- b. **Consider Approval of September 2018 Payables, Payroll and Transfers.**

Motion was made by Trustee Shipley and supported by Clerk Slater to approve the September 2018 Payables, Payroll and Transfers. Motion carried unanimously.

**Article 8. Unfinished Business**

- Article 9. New Business**
- 074-2018 Consider Approval of Zoning Map Correction – 3196 Kraft Ave.**  
Community Development Director Peterson reviewed the request with the Board. Motion was made by Trustee Koessel and supported by Trustee Shipley to approve the Zoning Map Correction regarding 3196 Kraft Ave. Motion carried unanimously by roll call vote.
- 075-2018 Consider Approval for Improvements at Burton Park Maintenance Building.**  
Community Development Director Peterson reviewed the proposed improvements. Motion was made by Trustee McDonald and supported by Trustee Lewis to approve Flier Brothers at the cost of \$150,887 for the Improvements at Burton Park Maintenance Building. Motion carried unanimously.
- 076-2018 Consider Approval of the Cascade Township Public Participation Plan.**  
Manager Swayze reviewed the proposed Public Participation Plan. Motion was made by Treasurer Peirce and supported by Trustee Shipley to approve the Cascade Township Public Participation Plan. Motion carried unanimously.
- Article 10. Closed Session.**  
**-Pursuant to Open Meetings Act 15.268(e) - To consult with its attorney regarding trial or settlement strategy in connection with a specific pending litigation.**  
**Case Name: Jane Doe v. Cascade Charter Township**  
**Case Number: 1:18-CV-00988**  
Motion was made by Trustee Koessel and supported by Trustee Shipley to close the regular session. Motion carried unanimously by roll call vote.
- Motion was made by Trustee Shipley and supported by Trustee McDonald to reconvene into regular session. Motion carried unanimously by roll call vote.
- Article 11. Public Comments – Any comments...whether it is on the Agenda or not. (limit comments to 3 minutes)**  
Ken Carey, Thornapple River Dr. was present to inform the Board that his lawsuit is finished along with several other issues...Master Plan meeting, Pathways and Ada Township.
- Article 12. Manager Comments**
- Article 13. Board Member Comments**  
Trustee Shipley offered the following comments:
- As always...thanked audience for attending.
- Article 14. Adjournment**  
Motion was made by Treasurer Peirce and supported by Trustee Shipley to adjourn. Motion carried unanimously.
- Meeting adjourned at 7:45 p.m.

Respectfully submitted,

Denise M. Biegalle  
Deputy Clerk

Approved by:

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Susan B. Slater, Clerk

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Robert S. Beahan, Supervisor

**MINUTES OF THE  
CASCADE CHARTER TOWNSHIP  
REGULAR BOARD MEETING**

Wednesday, October 24, 2018

7:00 P.M.

- Article 1.** Supervisor Beahan called the meeting to order.  
Present: Supervisor Beahan, Clerk Slater, Treasurer Peirce, Trustees Koessel, McDonald, Lewis and Shipley.  
Absent: None  
Also Present: Manger Swayze, DDA/Economic Development Director Korhorn and those listed on Supplement #1.
- Article 2.** Supervisor Beahan led the Pledge of Allegiance to the Flag.
- Article 3.** Motion was made by Trustee Lewis and supported by Trustee Koessel to approve the Agenda as presented. Motion carried unanimously.
- Article 4. Presentations**
- Article 5. Public Comments-Anything on the Agenda not scheduled for a public hearing. (limit comments to 3 minutes)**
- Article 6. Approval of Consent Agenda**  
a. Receive and File Various Meeting Minutes  
1. Regular Zoning Board of Appeals Minutes for 7/10/18.  
2. Regular Planning Commission Minutes for 10/1/18.  
Motion was made by Clerk Slater and supported by Trustee Shipley to approve the Consent Agenda as presented. Motion carried unanimously.
- Article 7. Financial Actions**
- Article 8. Unfinished Business**
- Article 9. New Business**  
**077-2018 Consider Approval for Pathway Bridge Repairs.**  
DDA/Economic Development Director Korhorn reviewed the Bids received for the pathway bridge repairs. Motion was made by Trustee McDonald and supported by Trustee Shipley to award the bid to Blackstar Building Group in the amount of \$71,785. Motion carried unanimously.
- 078-2018 Consider Approval of Resolution for VAI Purple Community Run to Close Public Streets for 5K Run/Walk on April 27, 2019.**  
DDA/Economic Development Director Korhorn reviewed the street closings. Motion was made by Treasurer Peirce and supported by Trustee Koessel to approve the Resolution to close Public Streets for 5K Run/Walk on April 27, 2019 for the VAI Purple Community Run. Motion carried unanimously by roll call vote.

**Article 10. Public Comments – Any comments...whether it is on the Agenda or not. (limit comments to 3 minutes)**

Douglas Swisher, 6218 Sanitgo Ct., expressed concern regarding civilian officers.

**Article 11. Manager Comments**

Manager Swayze offered the following comments:

- Had our Master Plan visioning session last week...it was a great opportunity for us to hear from our residents.
- The election is coming up...we are putting information out regarding our pathway millage.
- Update on PFAS ...there will be a meeting next Tuesday here at the Wisner Center.

**Article 12. Board Member Comments**

Trustee Shipley offered the following comments:

- VOTE!

Clerk Slater offered the following comments:

- Very busy getting ready for the election.

Trustee McDonald offered the following comments:

- Visioning process was a very good process.

**Article 13. Adjournment**

Motion was made by Treasurer Peirce and supported by Trustee Shipley to adjourn. Motion carried unanimously.

Meeting adjourned at 7:15 p.m.

Respectfully submitted,

Denise M. Biegalle  
Deputy Clerk

Approved by:

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Susan B. Slater, Clerk

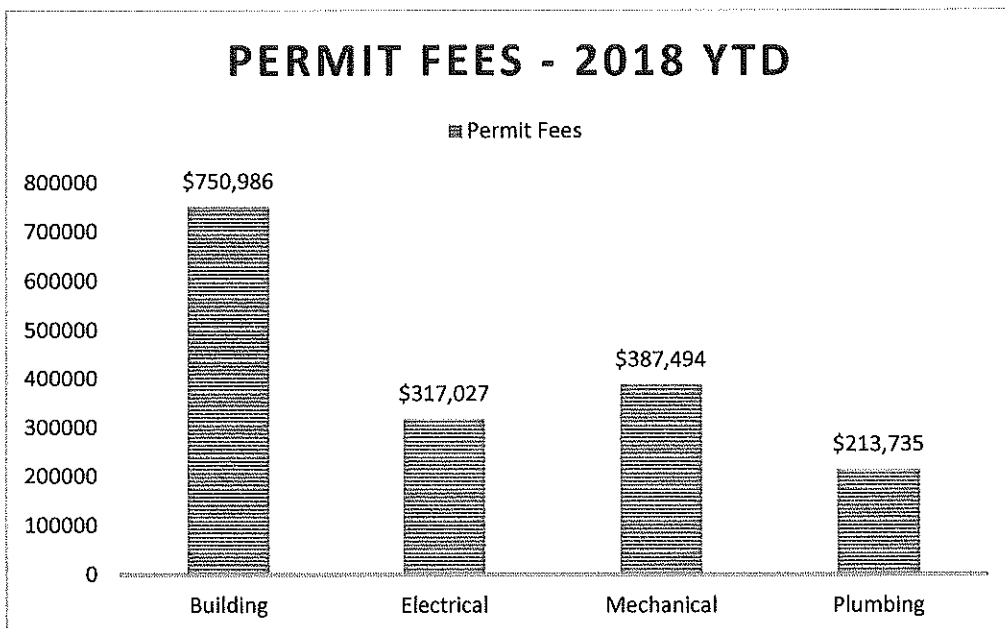
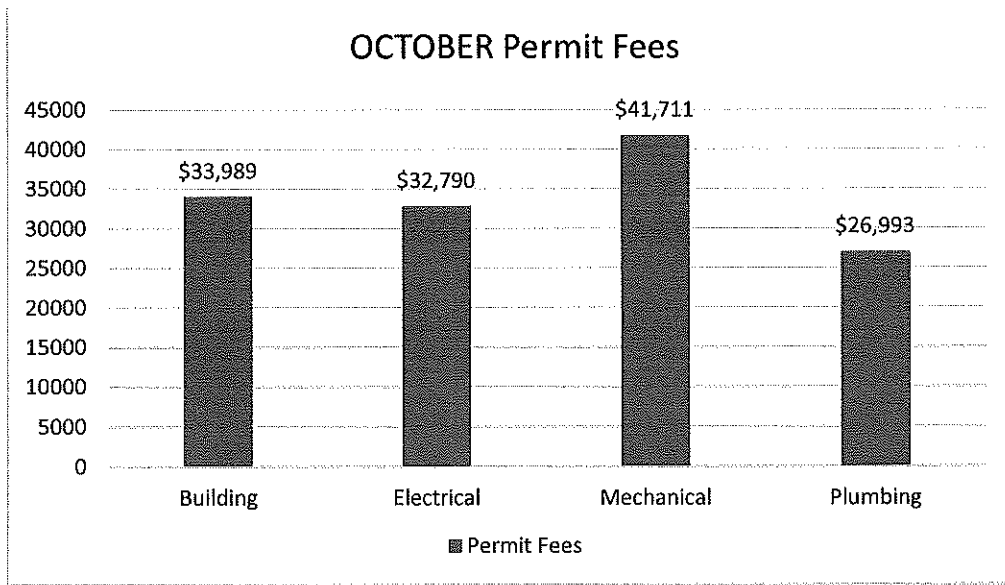
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Robert S. Beahan, Supervisor

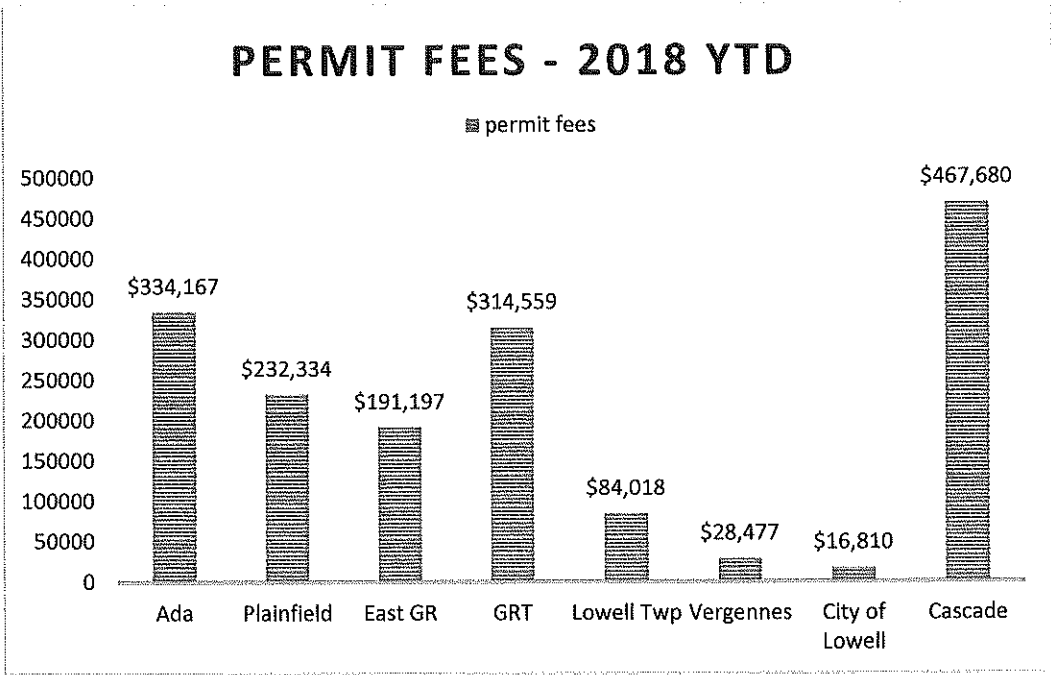
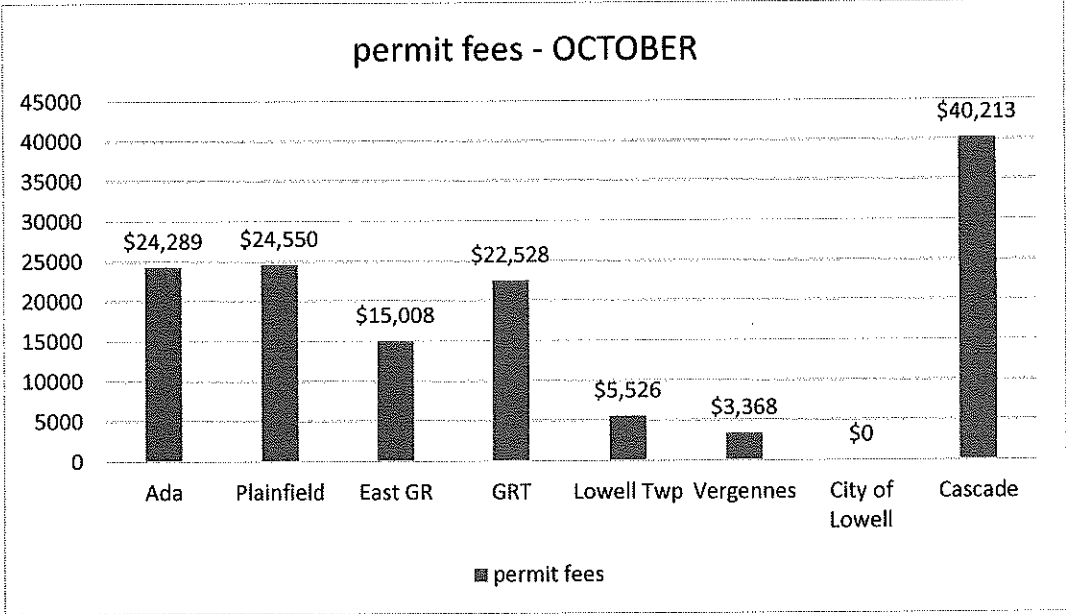
# Cascade Inspection Services

OCTOBER 2018

## Permit Fees by Type



# Permit Fees by Municipality



Township	#of Per	Building	#of Per	Electrical	# of Per	Mechanical	# of Per	Plumbing	Total Permits	Total Fees
PREV YTD TOTAL	1326	\$716,997.00	1650	\$284,237.00	2666	\$345,783.55	1302	\$186,742.00	6944	\$1,533,759.55
OCTOBER										
Cascade	43	\$13,174.00	32	\$7,883.00	64	\$11,807.00	31	\$7,349.00	170	\$40,213.00
Lowell Twp	16	\$3,390.00	4	\$580.00	9	\$915.00	3	\$641.00	32	\$5,526.00
Ada	32	\$5,414.00	36	\$8,059.00	67	\$7,395.00	22	\$3,421.00	157	\$24,289.00
Vergennes			6	\$909.00	14	\$1,835.00	4	\$624.00	24	\$3,368.00
GR Twp	32	\$6,528.00	21	\$5,949.00	40	\$4,880.00	32	\$5,171.00	125	\$22,528.00
EGR	43	\$5,483.00	30	\$3,917.00	34	\$3,493.25	17	\$2,115.00	124	\$15,008.25
Plainfield			49	\$5,493.00	104	\$11,385.25	44	\$7,672.00	197	\$24,550.25
City of Lowell									0	\$0.00
<b>MONTH TOTAL</b>	<b>166</b>	<b>\$3,989.00</b>	<b>178</b>	<b>\$32,790.00</b>	<b>332</b>	<b>\$41,710.50</b>	<b>153</b>	<b>\$26,993.00</b>	<b>829</b>	<b>\$135,482.50</b>

YTD 2018	1492	\$750,986.00	1828	\$317,027.00	2998	\$387,494.05	1455	\$213,735.00	7773	\$1,669,242.05
TOTAL-2017	1758	\$753,389.00	2210	\$376,979.00	3273	\$412,867.25	1485	\$219,324.00	8726	\$1,762,559.25
TOTAL-2016	1475	\$529,552.24	1992	\$310,463.00	3217	\$383,718.00	1404	\$190,762.00	8088	\$1,414,495.24
TOTAL-2015	1510	\$665,025.51	1948	\$327,865.00	3070	\$385,822.30	1361	\$216,089.00	7889	\$1,594,801.81
TOTAL-2014	1354	\$615,191.80	1780	\$297,971.00	2860	\$359,989.90	1257	\$196,553.00	7251	\$1,469,705.70
TOTAL-2013	1241	\$644,712.00	1667	\$288,442.06	2583	\$334,045.70	969	\$142,474.00	6460	\$1,409,673.76
TOTAL-2012	1,122	\$511,272.00	1,349	\$188,766.99	2,134	\$247,625.30	835	\$118,335.00	5,440	\$1,065,999.29
TOTAL-2011	949	\$410,550.75	990	\$148,549.50	1585	\$189,180.10	753	\$111,023.00	4277	\$859,303.35
TOTAL-2010	850	\$309,779.00	1330	\$162,994.00	1644	\$188,927.25	625	\$94,790.00	4449	\$756,490.25
TOTAL-2009	712	\$222,039.00	875	\$125,848.00	1313	\$149,101.75	554	\$74,397.00	3463	\$571,382.75
TOTAL-2008	848	\$582,100.75	1043	\$147,674.00	1348	\$164,271.30	697	\$91,695.00	3933	\$951,266.55
TOTAL-2007	1032	\$336,749.55	1069	\$137,857.00	1447	\$151,002.60	778	\$98,270.00	4326	\$723,879.15
TOTAL-2006	1181	\$481,673.30	1547	\$215,121.00	2147	\$243,076.90	1243	\$162,020.00	5173	\$940,523.41
TOTAL-2005	1032	\$419,355.30	1369	\$191,694.00	1874	\$211,234.15	1111	\$144,926.00	5386	\$967,209.45



**CASCADE CONSOLIDATED FEES**  
**YEAR 2018**

MONTH	Building Comm.		Building Residential		Electrical	Mechanical	Plumbing	TOTAL
JANUARY	\$400.00	\$2,563.00	\$12,791.00	\$6,745.00	\$2,498.00	\$25,017.00		
FEBRUARY	\$1,755.00	\$7,545.00	\$4,264.00	\$6,710.05	\$2,830.00	\$23,104.05		
MARCH	\$685.00	\$10,820.00	\$6,784.00	\$6,465.50	\$5,904.00	\$30,658.50		
APRIL	\$18,291.00	\$22,333.00	\$5,866.00	\$12,075.00	\$3,026.00	\$61,591.00		
MAY	\$22,805.00	\$17,831.00	\$4,875.00	\$9,300.00	\$5,477.00	\$60,288.00		
JUNE	\$21,680.00	\$5,068.00	\$4,751.00	\$7,242.50	\$4,508.00	\$43,249.50		
JULY	\$29,139.00	\$7,907.00	\$8,031.00	\$12,325.25	\$4,054.00	\$61,456.25		
AUGUST	\$10,242.00	\$7,268.00	\$9,752.00	\$12,181.00	\$6,792.00	\$46,235.00		
SEPTEMBER	\$62,022.00	\$6,787.00	\$9,725.00	\$4,574.50	\$2,759.00	\$75,867.50		
OCTOBER	\$9,394.00	\$3,780.00	\$7,883.00	\$11,807.00	\$7,349.00	\$40,213.00		
NOVEMBER								
DECEMBER								
<b>YEAR END TOTAL</b>	<b>\$166,413.00</b>	<b>\$91,922.00</b>	<b>\$74,722.00</b>	<b>\$89,425.80</b>	<b>\$45,197.00</b>	<b>\$467,679.80</b>		
PERMIT # FOR MONTH	9	34	32	64	31	170		
PREV PERMIT TOTAL	93	268	303	530	286	1480		
PERMIT TOTAL FOR YR	102	302	335	594	317	1650		
YEAR TO DATE	2018	\$467,679.80						
YEAR TO DATE	2017	\$452,846.50						
OVER	\$14,833.30							

## CASCADE SINGLE FAMILY HOMES

	OCT	YTD 2018	2017	2016	2015
Number of Permits					
New Residential Homes	1	39	57	56	62
VALUE - RESIDENTIAL	\$ 291,095.00	\$ 26,577,352.00	\$ 32,980,308.00	\$ 24,019,640.00	\$ 26,706,215.00

# Cascade Twp -Permit Report by Category/ Fee

10/1/2018 12:00: to 10/31/2018 12:0

Permit	Applicant	Address	Issue Date	Project Value	Permit Fee	Work Description
Res. Single Family						
PB18001399	CBH BUILDING & DEV	3174 HAYWARD DR SE	10/04/2018	291,095	779.00	RESIDENCE W/FINISHED BASEMI
				291,095	779.00	

1	Permits	Value Total	291,095	779.00	Fee Total
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**TREASURER'S DEPARTMENT**  
 CASCADE CHARTER TOWNSHIP  
 TAX ACCOUNTS  
 MAY 2018

**BANK BALANCES**

**TOWNSHIP BALANCES**

BANK	AMOUNT	REGISTER	AMOUNT
<b><u>CHEMICAL BANK</u></b>		<b><u>CHEMICAL BANK</u></b>	
TAX CHECKING	\$1,660.87	TAX CHECKING	\$1,660.87
<b><u>CHEMICAL BANK</u></b>		<b><u>CHEMICAL BANK</u></b>	
DELINQUENT TAX	\$25,969.07	DELINQUENT TAX	\$25,969.07
<b><u>CHEMICAL BANK</u></b>		<b><u>CHEMICAL BANK</u></b>	
TAX WIRE ACCT	\$3.23	TAX WIRE ACCT	\$3.23
<b>GRAND TOTAL</b>	<u><u>\$27,633.17</u></u>	<b>GRAND TOTAL</b>	<u><u>\$27,633.17</u></u>

Oxana Sourine 11/5/18

Kenneth B. Peirce 11/07/18

Submitted by  
 OXANA SOURINE  
 DEPUTY TREASURER

Date

Reviewed by  
 KENNETH B. PEIRCE  
 TREASURER

Date

FUND	INSTITUTION	DEMAND DEPOSIT		CDs			SECURITIES			TOTALS	
		\$	%	\$	%	DATE	\$	%	DATE	\$	%
101 GENERAL FUND	CHEMICAL	852,558.36	0.05								
	KENT CTY POOL	2,518,532.79	1.45								
	MI CLASS	1,004,147.17	2.00								
	INDEPENDENT										
	MERCANTILE										
	FLAGSTAR						312,389.49	1.20	9/27/2019		
	COMERICA BANK						510,599.72	0.90	7/20/2018		
	HORIZON BANK							1.00	5/22/2018		
	GRAND RIVER						528,848.86	1.81	9/23/2019		
	CONSUMERS CU						500,000.00	1.25	3/9/2019		
	MACATAWA						500,000.00	1.55	6/19/2019		
	FLAGSTAR						255,959.78	0.80	7/8/2019		
	PRIVATE BANK/CIBC						256,761.60	1.20	11/21/2018		
	COMERICA SECUR./JPM						505,780.89	1.00	9/12/2018		
	COMERICA SECUR./BONDS						500,000.00	1.50	3/15/2020		
	COMERICA SECUR./CP									500,000.00	1.10
									1,000,000.00	2.10	4/1/2019
									989,975.00	1.50	8/25/2018
<b>TOTAL GENERAL FUND</b>		<b>4,375,238.32</b>	<b>1.30</b>			<b>3,870,340.32</b>	<b>1.25</b>		<b>2,488,975.00</b>	<b>0.82</b>	
151 CEMETERY	LMCU	105,975.15	0.50								
206 FIRE FUND	CHEMICAL	117,541.89	0.05								
	MI CLASS	466,654.20	1.90								
	LMCU	5.00	-								
	COM CHOICE CU										
	FNBA								252,902.28	1.40	2/16/2019
	LEVEL ONE								531,427.61	1.50	7/24/2018
	MACATAWA								262,828.10	1.30	11/21/2018
	ADVENTURE CU								300,000.00	1.38	7/26/2018
	COMERICA SECUR./CP								255,693.63	1.50	3/23/2020
	COMERICA SECUR./FHLMC										
<b>TOTAL FIRE FUND</b>		<b>584,200.89</b>	<b>1.53</b>			<b>1,602,851.63</b>	<b>1.43</b>		<b>989,804.44</b>	<b>2.04</b>	<b>9/4/2018</b>
									500,000.00	1.50	9/13/2019
									<b>1,489,804.44</b>	<b>1.88</b>	
207 POLICE FUND	FLAGSTAR	184,774.36	1.25								
	FLAGSTAR										
	NORTHPOINTE BANK								300,000.00	1.48	9/10/2018
	PRIVATE BANK								257,586.39	1.30	10/8/2018
	FIRST COMMUNITY BANK								759,534.49	1.85	9/25/2019
<b>TOTAL POLICE FUND</b>		<b>184,774.36</b>	<b>1.25</b>			<b>1,567,100.88</b>	<b>1.55</b>		<b>250,000.00</b>	<b>1.00</b>	<b>3/13/2020</b>
208 HAZMAT FUND	LMCU	32,179.88	0.35								
209 OPEN SPACE	CHEMICAL	205,113.39	0.05								
	MI CLASS	358,381.89	2.00								
	LMCU (HOMEYER)										
	CWCW										
<b>TOTAL OPEN SPACE</b>		<b>563,495.28</b>	<b>1.29</b>			<b>200,000.00</b>	<b>0.90</b>	<b>10/15/2018</b>			
						<b>200,000.00</b>	<b>0.90</b>				
211 DAM REPAIR	LMCU	-	0.50								
	MI CLASS	311,536.15	2.00								
	LMCU										
<b>TOTAL DAM REPAIR</b>		<b>311,536.15</b>	<b>2.00</b>			<b>322,164.57</b>	<b>1.40</b>	<b>9/10/2018</b>			
						<b>322,164.57</b>	<b>1.40</b>				
216 PATHWAY FUND	MACATAWA	227,900.76	0.30								
	PRIVATE BANK/CIBC								503,000.00	2.05	10/17/2020
	GRAND RIVER								500,000.00	2.40	10/4/2019
	ADVENTURE CU								524,327.53	1.10	10/9/2018
<b>TOTAL PATHWAY FUND</b>		<b>227,900.76</b>	<b>0.30</b>			<b>1,527,327.53</b>	<b>1.84</b>				
246 PUBLIC UTILITY	CHEMICAL BANK	208,081.98	0.05								
	IRF										
	MI CLASS	619,219.75	2.00								
	CHEMICAL BANK										
<b>TOTAL PUBLIC UTILITY</b>		<b>825,301.71</b>	<b>1.51</b>			<b>500,000.00</b>	<b>0.95</b>	<b>6/29/2018</b>			
						<b>500,000.00</b>	<b>0.95</b>				
248 DDA FUND	LMCU	-	0.50								
	MI CLASS	617,814.26	2.00								
	CHEMICAL BANK	176,767.82	0.15								
	ADVENTURE CU										
<b>TOTAL DDA FUND</b>		<b>794,582.08</b>	<b>1.59</b>			<b>204,555.90</b>	<b>1.50</b>	<b>2/24/2020</b>			
						<b>204,555.90</b>	<b>1.50</b>				
249 BLDG. INSPECTION	CHEMICAL BANK	220,126.31	0.05								
	CHEMICAL BANK R.	63,772.00									
	CONSUMERS CU								305,310.87	1.00	3/10/2020
	CHEMICAL BANK								500,000.00	1.55	10/28/2019
	CHEMICAL BANK								300,000.00	1.75	4/30/2019
	FNB OF AMERICA								301,849.26	1.80	10/19/2020
	FNB OF AMERICA								105,533.99	1.85	12/18/2020
	FNB OF AMERICA								208,934.50	1.80	9/18/2019
	FNB OF MI								511,395.83	1.15	10/11/2019
	5/3 BANK								257,804.00	2.00	12/4/2019
	INDEPENDENT BANK								310,211.67	1.40	6/19/2019
<b>TOTAL BLDG. INSPECT.</b>		<b>283,896.31</b>	<b>0.04</b>			<b>2,800,640.42</b>	<b>1.51</b>				
270 LIBRARY FUND	UNITED BANK	518,542.63	0.40								
	LMCU										
	WMCB								880,306.43	1.40	9/21/2018
	NORTHPOINTE BANK								254,471.21	0.85	6/1/2018
<b>TOTAL LIBRARY FUND</b>		<b>516,542.63</b>	<b>0.40</b>			<b>1,662,629.70</b>	<b>1.51</b>		<b>547,852.06</b>	<b>2.00</b>	<b>4/7/2020</b>
701 T & A	CHEMICAL BANK	164,497.06	0.05								
701 JAMES TIMMONS	CHEMICAL BANK								12,400.00	2.00	3/21/2022
701 JACK SMITH INV.	CHEMICAL BANK	22,844.19	0.05								
701 HENRY KRAMER	CHEMICAL BANK	15,199.82	0.05								
<b>TOTAL</b>		<b>9,008,166.57</b>	<b>1.23</b>			<b>14,270,010.95</b>	<b>1.44</b>		<b>3,976,779.44</b>	<b>0.70</b>	<b>27,256,956.96</b>
											<b>1.34</b>

Submitted by *Oxana Sourine* Date *11/5/18*  
Oxana Sourine Deputy Treasurer

Reviewed by *Ken Peirce* Date *11/07/18*  
Ken Peirce Treasurer

**TREASURER'S DEPARTMENT**  
**CASCADE CHARTER TOWNSHIP**  
**TAX ACCOUNTS**  
**JUNE 2018**

**BANK BALANCES**

**TOWNSHIP BALANCES**

BANK	AMOUNT
<b><u>CHEMICAL BANK</u></b>	
TAX CHECKING	\$1,231.87
<b><u>CHEMICAL BANK</u></b>	
DELINQUENT TAX	\$561.55
<b><u>CHEMICAL BANK</u></b>	
TAX WIRE ACCT	\$8.28
<b>GRAND TOTAL</b>	<b><u><u>\$1,801.70</u></u></b>

REGISTER	AMOUNT
<b><u>CHEMICAL BANK</u></b>	
TAX CHECKING	\$1,231.87
<b><u>CHEMICAL BANK</u></b>	
DELINQUENT TAX	\$561.55
<b><u>CHEMICAL BANK</u></b>	
TAX WIRE ACCT	\$8.28
<b>GRAND TOTAL</b>	<b><u><u>\$1,801.70</u></u></b>

Oxana Sourine      11/5/18

Kenneth B. Peirce      11/07/18

Submitted by  
OXANA SOURINE  
DEPUTY TREASURER

Date

Reviewed by  
KENNETH B. PEIRCE  
TREASURER

Date

CASCADE CHARTER TOWNSHIP  
TREASURER'S OFFICE REPORT

JUNE 2018

FUND	INSTITUTION	DEMAND DEPOSIT		CDs			SECURITIES			TOTALS	
		\$	%	\$	%	DATE	\$	%	DATE	\$	%
101 GENERAL FUND	CHEMICAL	659,634.30	0.05								
	KENT CTY POOL	2,521,666.66	1.50								
	MI CLASS	1,005,884.57	2.10								
	INDEPENDENT			312,389.49	1.20	9/27/2019					
	MERCANTILE			510,599.72	0.90	7/20/2018					
	COMERICA BANK			528,848.86	1.61	9/23/2019					
	HORIZON BANK			500,000.00	1.25	3/9/2019					
	GRAND RIVER			500,000.00	1.55	6/19/2019					
	CONSUMERS CU			255,959.76	0.80	7/8/2019					
	MACATAWA			256,761.60	1.20	11/21/2018					
	FLAGSTAR			505,780.89	1.00	9/12/2018					
	PRIVATE BANK/CIBC			500,000.00	1.50	3/15/2020					
	COMERICA SECUR./JPM						500,000.00	1.10	8/16/2018		
	COMERICA SECUR./BONDS						1,000,000.00	2.10	4/1/2019		
COMERICA SECUR./CP						981,700.00	2.45	3/22/2019			
<b>TOTAL GENERAL FUND</b>		<b>4,187,185.53</b>	<b>1.42</b>	<b>3,870,340.32</b>	<b>1.25</b>		<b>2,481,700.00</b>	<b>2.04</b>		<b>10,539,225.85</b>	<b>1.50</b>
151 CEMETERY	LMCU	105,561.25	0.50							105,561.25	0.50
206 FIRE FUND	CHEMICAL	17,500.10	0.05								
	MI CLASS	467,461.62	2.10								
	LMCU	5.00	-								
	COM CHOICE CU			252,902.29	1.40	2/16/2019					
	FNBA			531,427.61	1.50	7/24/2018					
	LEVEL ONE			262,828.10	1.30	11/21/2018					
	MACATAWA			300,000.00	1.38	7/26/2018					
	ADVENTURE CU			255,693.63	1.50	3/23/2020					
	COMERICA SECUR./CP						989,804.44	2.04	9/4/2018		
	COMERICA SECUR./FHLMC						500,000.00	1.50	9/13/2019		
<b>TOTAL FIRE FUND</b>		<b>484,966.72</b>	<b>2.03</b>	<b>1,602,851.63</b>	<b>1.43</b>		<b>1,489,804.44</b>	<b>1.86</b>		<b>3,577,622.79</b>	<b>1.69</b>
207 POLICE FUND	FLAGSTAR	133,160.27	1.25								
	FLAGSTAR			300,000.00	1.48	9/10/2018					
	NORTHPOINTE BANK			257,566.39	1.30	10/8/2018					
	PRIVATE BANK			759,534.49	1.85	9/25/2019					
	FIRST COMMUNITY BANK			250,000.00	1.00	3/13/2020					
<b>TOTAL POLICE FUND</b>		<b>133,160.27</b>	<b>1.25</b>	<b>1,567,100.88</b>	<b>1.55</b>					<b>1,700,261.15</b>	<b>1.53</b>
208 HAZMAT FUND	LMCU	27,409.00	0.35							27,409.00	0.35
209 OPEN SPACE	CHEMICAL	210,504.15	0.05								
	MI CLASS	359,001.98	2.10								
	LMCU (HOMEYER)		0.50								
	CWCU			200,000.00	0.90	10/15/2018					
<b>TOTAL OPEN SPACE</b>		<b>569,506.13</b>	<b>1.34</b>	<b>200,000.00</b>	<b>0.90</b>					<b>769,506.13</b>	<b>1.23</b>
211 DAM REPAIR	LMCU	-	0.50								
	MI CLASS	312,075.17	2.10								
	LMCU			322,164.57	1.40	9/10/2018					
<b>TOTAL DAM REPAIR</b>		<b>312,075.17</b>	<b>2.10</b>	<b>322,164.57</b>	<b>1.40</b>					<b>634,239.74</b>	<b>1.74</b>
216 PATHWAY FUND	MACATAWA	231,346.93	0.30								
	PRIVATE BANK/CIBC			503,000.00	2.05	10/17/2020					
	GRAND RIVER			500,000.00	2.40	10/4/2019					
	ADVENTURE CU			524,327.53	1.10	10/8/2018					
<b>TOTAL PATHWAY FUND</b>		<b>231,346.93</b>	<b>0.30</b>	<b>1,527,327.53</b>	<b>1.84</b>					<b>1,758,674.46</b>	<b>1.64</b>
246 PUBLIC UTILITY	CHEMICAL BANK	195,987.83	0.05								
	LMCU		0.50								
	IRF	620,291.13	2.10								
	CHEMICAL BANK			514,640.80	2.25	1/5/2020					
<b>TOTAL PUBLIC UTILITY</b>		<b>816,278.96</b>	<b>1.61</b>	<b>514,640.80</b>	<b>2.25</b>					<b>1,330,919.76</b>	<b>1.86</b>
248 DDA FUND	LMCU	-	0.50								
	MI CLASS	618,883.21	2.10								
	CHEMICAL BANK	167,204.65	0.15								
	ADVENTURE CU			204,555.90	1.50	2/24/2020					
	<b>TOTAL DDA FUND</b>		<b>786,087.86</b>	<b>1.69</b>	<b>204,555.90</b>	<b>1.50</b>					<b>990,643.76</b>
249 BLDG. INSPECTION	CHEMICAL BANK	309,854.16	0.05								
	CHEMICAL BANK R.	59,407.25									
	CONSUMERS CU			305,310.87	1.00	3/10/2020					
	CHEMICAL BANK			500,000.00	1.55	10/28/2019					
	CHEMICAL BANK			300,000.00	1.75	4/30/2019					
	FNB OF AMERICA			301,649.26	1.80	10/19/2020					
	FNB OF AMERICA			105,533.99	1.85	12/18/2020					
	FNB OF AMERICA			208,934.50	1.60	9/18/2019					
	FNB OF MI			511,395.83	1.15	10/11/2018					
	S/3 BANK			257,604.00	2.00	12/4/2019					
	INDEPENDENT BANK			310,211.97	1.40	6/16/2019					
	CHEMICAL BANK			2,800,640.42	1.51						
	<b>TOTAL BLDG. INSPECT.</b>		<b>369,261.41</b>	<b>0.04</b>	<b>2,800,640.42</b>	<b>1.51</b>					<b>3,169,901.83</b>
270 LIBRARY FUND	UNITED BANK	507,632.32	0.40								
	LMCU			860,306.43	1.40	9/21/2018					
	WMCB			258,829.54	2.60	6/1/2020					
	NORTHPOINTE BANK			547,852.06	2.90	4/7/2020					
<b>TOTAL LIBRARY FUND</b>		<b>507,632.32</b>	<b>0.40</b>	<b>1,666,988.03</b>	<b>1.78</b>					<b>2,174,620.35</b>	<b>1.46</b>
701 T & A	CHEMICAL BANK	162,406.30	0.05							162,406.30	0.05
701 JAMES TIMMONS	CHEMICAL BANK			12,400.00	2.00	3/21/2022				12,400.00	2.00
701 JACK SMITH INV.	CHEMICAL BANK	22,861.19	0.05							22,861.19	0.05
701 HENRY KRAMER	CHEMICAL BANK	15,205.50	0.05							15,205.50	0.05
<b>TOTAL</b>		<b>8,730,944.54</b>	<b>1.32</b>	<b>14,289,010.08</b>	<b>1.52</b>		<b>3,971,504.44</b>	<b>1.97</b>		<b>26,991,459.06</b>	<b>1.52</b>

Submitted by *Oxana Sourine* 11/5/18  
Oxana Sourine Deputy Treasurer

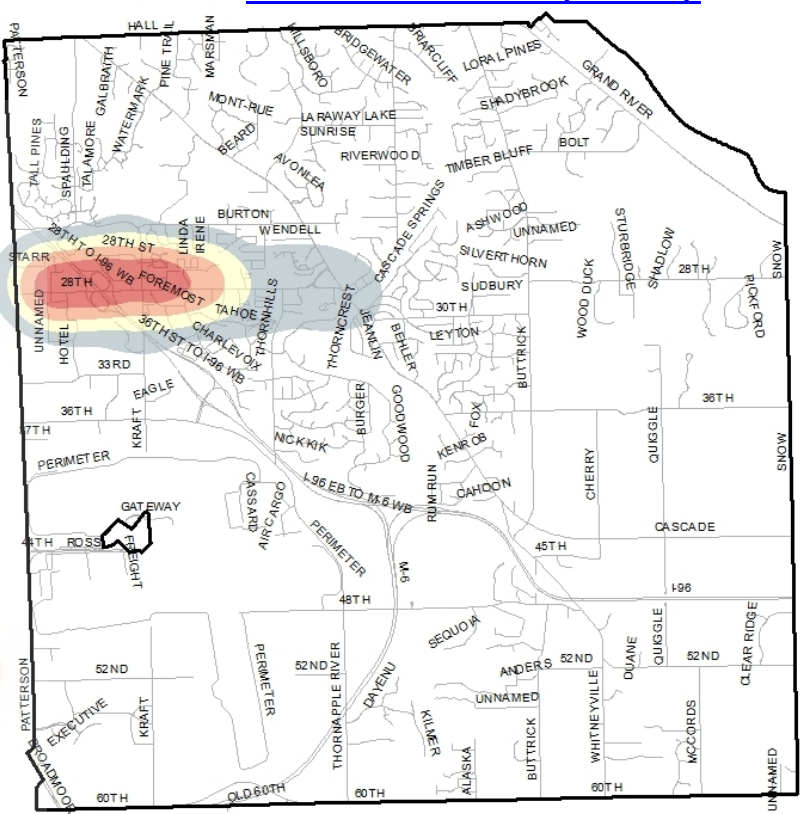
Reviewed by *Ken Peirce* 11/07/18  
Ken Peirce Treasurer



# Kent County Sheriff Department

## Calls for Service "Hotspot" Map

1 ●●●



● Total 3<sup>rd</sup> Qtr Reported Offenses: 350 (5<sup>th</sup>)

● Top 3 Calls For Service: ●●●  
1. Alarm (147 Calls)  
2. Suspicious Condition/Noise/Subject (82 Calls)  
3. Traffic Crash - Property Damage (76 Calls)

● Top 3 Repeat Call Addresses: ●●●  
1. 5800 blk 28th St SE (74 Calls)  
2. 5100 blk 28th St SE (69 Calls)  
3. 5500 blk 28th St SE (61 Calls)

● Top 3 Responding Units: ●●●  
1. 4121 (207 Calls)  
2. 4321 (193 Calls)  
3. 4425 (167 Calls)

● Avg. # of Units Assigned Per Call: 1.76 (9<sup>th</sup>)

● Avg. Hold Time: 8 Min, 2 Seconds ●●●  
5

● Avg Response Time: 18 Min, 20 Seconds ●●●  
6

● Top 3 Crimes ●●●  
1. Retail Fraud - 68  
2. Obstructing Justice - 44  
3. Driving Law Violations - 44

● Total Detective Bureau Time: 234 Hours (3<sup>rd</sup>)

**Legend**  
● Low Density  
● Medium  
● Medium High  
● High Density



Click on flame for hotspot details





# Kent County Sheriff Department

1 ●●●

● Total 3<sup>rd</sup> Qtr Reported Offenses: 165 (6<sup>th</sup>)

● Top 3 Calls For Service: ●●●

1. Alarm (102 Calls)
2. Traffic Crash - Property Damage (51 Calls)
3. Suspicious Condition/Noise/Subject (43 Calls)

● Top 3 Repeat Call Addresses: ●●●

1. 1000 blk E Beltline Ave NE (26 Calls)
2. 600 blk Kenmoor Ave SE (20 Calls)
3. 3400 Blk Plainfield Ave NE (17 Calls)

● Top 3 Responding Units: ●●●

1. 4223 (144 Calls)
2. 4225 (109 Calls)
3. 4423 (108 Calls)

● Avg. # of Units Assigned Per Call: 1.80 (5<sup>th</sup>)

● Avg. Hold Time: 7 Min, 52 Seconds ●●●

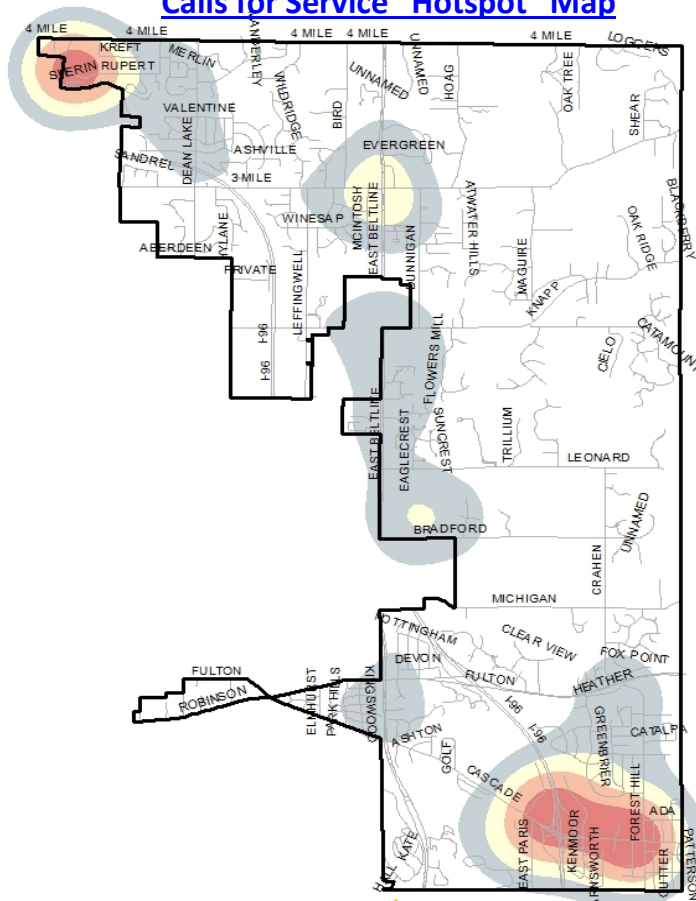
● Avg Response Time: 18 Min, 7 Seconds ●●●

● Top 3 Crimes ●●●

1. Driving Law Violations - 31
2. Obstruction of Justice - 21
3. OUIL or OUID - 16

● Total Detective Bureau Time: 55 Hours (10<sup>th</sup>)

## Calls for Service "Hotspot" Map



### Legend

- Low Density
- Medium
- Medium High
- High Density



Click on flame for hotspot details



## GRAND VALLEY METROPOLITAN COUNCIL

ADA TOWNSHIP • ALGOMA TOWNSHIP • ALLENDALE TOWNSHIP • ALPINE TOWNSHIP • BELDING • BYRON TOWNSHIP • CALEDONIA • CALEDONIA TOWNSHIP • CANNON TOWNSHIP • CASCADE TOWNSHIP  
CEDAR SPRINGS • COOPERSVILLE • COURTLAND TOWNSHIP • EAST GRAND RAPIDS • GAINES TOWNSHIP • GEORGETOWN TOWNSHIP • GRAND RAPIDS • GRAND RAPIDS TOWNSHIP • GRANDVILLE  
GREENVILLE • HASTINGS • HUDSONVILLE • IONIA • JAMESTOWN TOWNSHIP • KENT COUNTY • KENTWOOD • LOWELL • LOWELL TOWNSHIP • MIDDLEVILLE • NELSON TOWNSHIP  
OTTAWA COUNTY • PLAINFIELD TOWNSHIP • ROCKFORD • SAND LAKE • SPARTA • TALLMADGE TOWNSHIP • WALKER • WAYLAND • WYOMING

October 8, 2018

Mr. Ben Swayze  
Cascade Township  
2865 Thornhills Avenue SE  
Grand Rapids, MI 49546

Dear Ben:

Now that fall is upon us and the Clean Air Action display has finished circulating through the area, I wanted to take a moment to thank you for being a host location. Asking cities, townships, libraries and other organizations to host the Clean Air Action display is one of the three principal ways through which we educate the public about air quality, with the other two ways being our annual radio/television campaign and participation in community fairs and events.

This year, the display made its way to 19 different cities, townships, libraries, and organizations over the spring, summer and fall. Just like past years, no matter where the display was placed, the materials I left disappeared very quickly, which meant that you played a big role in getting information about our program into the hands of the public. Thank you for supporting the Clean Air Action program by participating in this effort!

I would certainly appreciate your willingness to host the display again next year. Also, if you are aware of any upcoming events within your community in which I could participate and represent the Clean Air Action program, please let me know. My contact information is below.

Sincerely,

A handwritten signature in black ink that reads "Andrea Faber". The signature is written in a cursive, flowing style.

Andrea Faber  
Clean Air Action Program Coordinator  
616.776.7603  
andrea.faber@gvmc.org



October 8, 2018

Grand Rapids City Commission  
Grand Rapids City Hall  
300 Monroe Ave NW, 5<sup>th</sup> Floor  
Grand Rapids, MI  
49503

**RE: Request Uniformity in Application of All Medical Marijuana Ordinance Buffers**

Greetings City Commission:

On behalf of the neighboring communities, we thank Mayor Bliss, Suzanne Schulz, and the Grand Rapids Planning team for meeting with us to discuss the adopted Grand Rapids Medical Marijuana ordinance buffers and how they will be applied. Throughout this mapping exercise, it was discovered that the 1000-foot buffer for residential properties would only apply to residential areas within the City of Grand Rapids.

This adopted language would allow for a Marijuana facility to be located within 1000-feet of the Godfrey-Lee residential neighborhood within the City of Wyoming.

The Grand Rapids City Commission recognized a concern with placing a marijuana facility within or near a residential area and added residential buffers to address this concern within the Grand Rapids border.


The neighboring communities formally request that the ordinance be amended to also buffer residential areas that are not located within the City of Grand Rapids.

As the greater Grand Rapids community continues to build vibrant places to meet the needs of West Michigan, we want to ensure that our communities are growing together thoughtfully and respectfully. Applying all buffers equally to Grand Rapids property and neighboring community property will help achieve that objective.

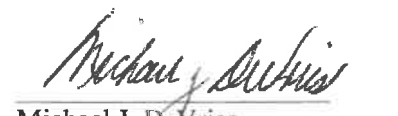
Thank you for your time and consideration on this item.


Sincerely,

NEIGHBORING COMMUNITY LEADERS


  
Jack Poll, Mayor  
City of Wyoming


  
Stephen C.N. Kerpel, Mayor  
City of Kentwood

  
Michael J. DeVries  
Grand Rapids Charter Township

  
Robert Homan, Supervisor  
Plainfield Charter Township

  
Mark Huizenga, Mayor  
City of Walker

  
Anna Seibold, Mayor  
City of East Grand Rapids

  
Robert Beahan, Supervisor  
Cascade Charter Township



RICK SNYDER  
GOVERNOR

STATE OF MICHIGAN  
DEPARTMENT OF LICENSING AND REGULATORY AFFAIRS  
PUBLIC SERVICE COMMISSION

SHELLY EDGERTON  
DIRECTOR

NORM SAARI  
COMMISSIONER

SALLY A. TALBERG  
CHAIRMAN

RACHAEL EUBANKS  
COMMISSIONER

October 15, 2018

To Cities/Villages/Townships:

This letter is being sent to franchise entities (municipalities) within the state of Michigan regarding Public Act 480 of 2006, the Uniform Video Services Local Franchise Act (the Act). The Michigan Public Service Commission (MPSC) is the agency designated to implement the Act. Pursuant to Section 12(2) of the Act, the MPSC shall file an annual report to the Governor and Legislature that includes information on the status of video service competition in Michigan.

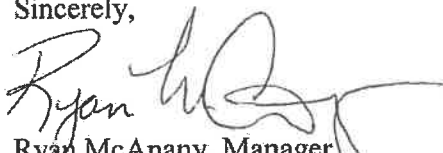
To assist MPSC Staff with gathering information for the report, please complete our electronic survey, which is located at [michigan.gov/mpsc](http://michigan.gov/mpsc). Beginning **October 19, 2018**, click on the Video/Cable link on the left side of the webpage and look for the survey in the Spotlight section. Please submit your responses to the survey by **November 16, 2018**. *Please note that the survey will not be available on the website after November 16, 2018.*

The survey is quick and easy and should take only a few minutes of your time. It is important that MPSC Staff receives feedback from franchise entities. Your feedback will help to provide MPSC Staff with a better insight of the video/cable issues that may be occurring in your community. While MPSC Staff cannot provide you with answers to the survey questions, please contact me if you require clarification regarding the questions being asked.

In addition to the survey, please find attached two Consumer Tips that provide information regarding filing a video/cable complaint with the MPSC. One is relevant to customers, the other to a municipality. We would encourage you to share this information with your residents. You may also find the complaint information online at [michigan.gov/mpsc](http://michigan.gov/mpsc) by clicking on the Video/Cable link. You may consider posting the MPSC contact information and/or a link to our Consumer Tips to your community's webpage.

Your cooperation in submitting your survey answers to our office is greatly appreciated. Should you have any questions, please contact Jennifer Callahan at (517) 284-8205 or by email at [callahanj@michigan.gov](mailto:callahanj@michigan.gov).

Sincerely,



Ryan McAnany, Manager  
Telecommunications Division

Attachments

## Filing a Video/Cable Complaint

### The MPSC's role in handling video/cable television complaints

On December 21, 2006, Governor Granholm signed legislation to promote competition for video services in the state of Michigan. Public Act 480 of 2006, or as it is more commonly known, the "Uniform Video Services Local Franchise Act" charges the Michigan Public Service Commission (MPSC) with implementing the Act. The MPSC now has the responsibility to handle cable inquiries and complaints.

### Are you having a problem with your video/cable television provider?

If you are experiencing problems with your provider, you should first contact your provider and attempt to resolve your dispute with them.

### Not satisfied? File an informal complaint with the MPSC

If you are dissatisfied with the provider's response, or the dispute is not resolved to your satisfaction, you may file an informal complaint with the MPSC.

### How does the informal complaint process work?

- A customer contacts the MPSC with a video/cable television complaint.

- MPSC Staff forwards the complaint to the provider & informally mediates (if necessary) between the provider and the customer.

The provider is allowed up to 10 business days (under normal circumstances) to respond and provide a detailed resolution to both the customer and the MPSC.

### Still not satisfied? File a formal complaint and request a hearing

If you remain dissatisfied even after the Staff has completed the informal complaint process, you may file a Formal Complaint.

A customer will be permitted to file a formal complaint *only after*:

- the informal complaint process has been completed; and
- a satisfactory resolution has not been reached between the provider and the customer.

To request a formal hearing, prepare a letter of complaint explaining the problem. Send the original and seven (7) copies of the letter/complaint to the MPSC at the following address:

**Executive Secretary  
MPSC  
P.O. Box 30221  
Lansing, MI 48909**

The written complaint must contain the following information:

- customer name, address, telephone number, and signature;
- the name and address of the provider with whom there is a disagreement;
- the location/address of the disputed action;
- the time and dates of the disputed actions;
- a description of exactly what happened – include all details, the names and addresses of any persons involved, disputed charges and costs.

Identify the specific section(s) of the Video Act that are alleged to have been violated and state sufficient facts to support the alleged violation(s). Specify the relief requested.

#### **Next Action**

MPSC Staff will review the formal complaint, and if the disputed amount is under \$5,000 and all required information is included, the Commission shall appoint a mediator within seven (7) business days of the date the complaint is filed. Mediation may include a review of the complaint and discussions with the customer and company. If through this process the customer and company are still unable to agree, the mediator will issue a recommended solution within 30 days from the date of appointment. The customer and company have 10 days to either accept or reject the recommendation. If the customer or company rejects the solution, the complaint proceeds to a formal hearing. If the dispute involves an amount over \$5,000, it proceeds directly to a contested case hearing with no prior mediation.

#### **Formal Complaint Hearing Process**

A formal complaint hearing is a trial-like proceeding. This means that the customer, the cable company, and MPSC Staff will come before an administrative law judge. A formal complaint

proceeding is separate from any informal proceeding related to the problem that may have taken place. Lawyers represent the cable company. Customers may hire a lawyer, represent themselves (excluding some businesses), or bring someone to assist them. The customer must present information and witnesses, to prove or justify his/her position. The MPSC cannot provide a lawyer or pay any legal fees. After the hearing, the judge will issue a proposed decision. However, the MPSC will make the final decision, and will issue its decision in a MPSC order. During this process the customer and the company may continue to try to settle the problem. However, the MPSC must approve any agreement that is reached.

#### **Required Costs**

If the customer or company rejects the mediator's decision and is found by MPSC order to be at fault, that party will be responsible for the legal costs of the other party. If both the customer and the company reject the mediator's decision, each party pays their own legal costs.

#### **For more information:**

For more information about filing a complaint, PA 480, or the dispute resolution process, go to the MPSC website at: [michigan.gov/mpsc](http://michigan.gov/mpsc). Click on the [video/cable](#) button.

#### **You may also contact the MPSC at:**

Telecommunications Division  
Attn: Video Franchising  
P.O. Box 30221  
Lansing, MI 48909

Phone: (800) 292-9555  
Fax: (517) 284-8200

#### **Filing Satellite Complaints**

The Federal Trade Commission (FTC) at: (877) 382-4357 or [ftc.gov](http://ftc.gov) handles satellite complaints/inquiries.

## Dispute Resolution: Franchise Entity (Municipality) or Provider vs. Provider

### The Michigan Public Service Commission's (MPSC) role in informal and formal video/cable television complaints:

Public Act 4 of 2009 — Providing a dispute resolution process for complaints between municipalities or providers and cable providers.

#### Who can file an informal complaint on behalf of a municipality/provider?

A municipality/provider may speak on behalf of itself when filing an informal complaint. Legal representation is not required until a formal complaint is filed.

#### What does a municipality/provider need to do to file an informal complaint?

The municipality/provider shall file a written notice of the dispute with the MPSC.

#### What information is required in the notice of dispute?

- Identifying the nature of the dispute.
- Language that requests an informal dispute resolution process.
- Language stating the other party has been served the notice of the dispute.

#### What happens after the notice is filed?

Commission staff will conduct an informal

mediation with both parties in an attempt to resolve the dispute.

#### What if the dispute is not resolved with informal mediation?

If a satisfactory resolution to the dispute is not achieved any named party in the complaint may file a formal complaint.

#### How does the formal complaint process begin?

A representative submits the following, in writing, to the commission:

- Information that states the section(s) of the public act or franchise agreement that was allegedly violated.
- Sufficient facts to support the allegations.
- The relief requested.
- All information— testimony, exhibits and other documents— in possession the party intends to rely on to support the complaint.

#### How does the formal complaint process proceed?

- Once the complaint is filed each party has ten days to agree on alternative means to resolve the complaint.
- If no agreement is reached within 10 days, the Commission shall order mediation.
- Within 60 days from the date mediation is ordered, the mediator shall issue a recommended settlement.

### **What happens after the proposed settlement is presented?**

- Each party shall file, with the Commission, a written acceptance or rejection of the recommended settlement within 7 days.
- If the parties accept the recommendation, then the recommendation shall become the final order.
- If a party rejects or fails to respond within 7 days to a proposed settlement, then the complaint will proceed to a contested case hearing.
- A party that rejects the recommended settlement shall pay the opposing party's actual costs of proceeding to a contested case hearing.

### **What is the format of a contested case hearing?**

A contested case hearing is provided under section 203 of the Michigan telecommunications act, 1991 PA 179, MCL 484.2203

[www.legislature.mi.gov/\(S\(vtxbagg55qxrjz45wc3nmuim\)\)/mileg.aspx?page=GetMCLDocument&objectname=mcl-484-2203a](http://www.legislature.mi.gov/(S(vtxbagg55qxrjz45wc3nmuim))/mileg.aspx?page=GetMCLDocument&objectname=mcl-484-2203a)

### **For more information:**

For more information about filing a formal complaint, Public Act 480, or the dispute resolution process (PA 4 of 2009), go to the MPSC website at: [michigan.gov/mpsc](http://michigan.gov/mpsc); click on the [video/cable](#) tab.

### **You may also contact the MPSC at:**

Telecommunications Division  
Attn: Video Franchising  
7109 W. Saginaw Hwy.  
P.O. Box 30221  
Lansing, MI 48909

Phone: (800) 292-9555

Fax: (517) 284-8200

### **Online Formal Complaint Form:**

Complaints can be filed online via the video/cable web site.

[michigan.gov/mpsc/complaints](http://michigan.gov/mpsc/complaints)

# Memo

**To:** Cascade Township Board  
**From:** Roger Mc Carty, Assessor  
**CC:**  
**Date:** 11/7/2018  
**Re:** Request to approve revised Resolution to Approve the Levy the 2018 Millage Rates

---

The Board approves this resolution each year announcing the millage rates that will be levied on the winter tax bill. This year the millages have a small reduction due to the Headlee millage rollback. We announced our intent to levy the millage by resolution back in December. We are now by resolution stating we are going to levy the millage.

In August, the Board approved a resolution to approve the levy of the 2018 millage rates. That resolution did not include the pathway millage which had expired. On November 6, 2018 the voters approved a new pathway millage which is to be levied this year. As a result, we have modified our 2018 Tax Rate Request form (L 4029) for the Clerk and Supervisor to sign by adding a second page which has the Pathway millage. Attached for your approval is a revised *Resolution to Approve the Levy of the 2018 Millage Rates* which includes the Pathway millage. This resolution will replace the earlier approved resolution.

**CASCADE CHARTER TOWNSHIP**  
**Kent County, Michigan**  
**Resolution / 2018**

**RESOLUTION TO APPROVE THE LEVY OF THE 2018  
MILLAGE RATE**

WHERE AS, Cascade Township has complied with Section 16 of the Uniform Budgeting and Accounting Act by stating in the Annual Budget Meeting that “The property tax millage rate proposed to be levied to support the proposed budget will be subject of this hearing”. Thus, the Township is not required to hold a separate Truth in Taxation hearing. Further, the Board has passed a “Resolution of Intent to Levy the 2018 Millage Rate”, Resolution #45 / 2017 on December 13, 2017.

WHERE AS, the Act requires that the proposed millage rate, as defined in the Act, be established by resolution of the Township Board.

NOW, THEREFORE, BE IT RESOLVED BY THE CASCADE CHARTER TOWNSHIP BOARD:

1. In order to provide sufficient revenue for the Township for operating purposes for the 2018 fiscal year, the Township shall levy total mills of 3.4623. This includes .2480 mills for police, .2100 for police, .2272 for fire, .5058 mills for fire, .1493 mills for library, .3500 mills for pathway, .5775 for fire, .2290 for open spaces and .9674 mills for operating purposes.
2. All resolutions and parts of resolutions insofar as they conflict with the provisions of this resolution are hereby rescinded.

The foregoing resolution was offered on November 14, 2018 by Board Member and supported by Board Member with the vote being as follows:

YEAS:

NAYS:

ABSENT:

Resolution declared adopted.

---

Susan Slater  
Cascade Charter Township Clerk

**CERTIFICATION**

I hereby certify the foregoing to be a true copy of a Resolution adopted by the Cascade Charter Township Board at a Regular Board Meeting held on November 14, 2018

---

Susan Slater  
Cascade Charter Township Clerk

**2018 Tax Rate Request (This form must be completed and submitted on or before September 30, 2018)**

Carefully read the instructions on page 2.

**MILLAGE REQUEST REPORT TO COUNTY BOARD OF COMMISSIONERS**

This form is issued under authority of MCL Sections 211.24e, 211.34 and 211.34d. Filing is mandatory. Penalty applies.

County(ies) Where the Local Government Unit Levies Taxes <b>KENT</b>	2018 Taxable Value of ALL Properties in the Unit as of 5-29-18 <b>TV ALL \$1,575,163,779 TV MINUS REN ZONE \$1,566,153,827</b>
Local Government Unit Requesting Millage Levy <b>CASCADE TOWNSHIP</b>	For LOCAL School Districts: 2018 Taxable Value excluding Principal Residence, Qualified Agricultural, Qualified Forest, Industrial Personal and Commercial Personal Properties.

**This form must be completed for each unit of government for which a property tax is levied. Penalty for non-filing is provided under MCL Sec 211.119. The following tax rates have been authorized for levy on the 2018 tax roll.**

(1) Source	(2) Purpose of Millage	(3) Date of Election	(4) Original Millage Authorized by Election Charter, etc.	(5)** 2017 Millage Rate Permanently Reduced by MCL 211.34d "Headlee"	(6) 2018 Current Year "Headlee" Millage Reduction Fraction	(7) 2018 Millage Rate Permanently Reduced by MCL 211.34d "Headlee"	(8) Sec. 211.34 Truth in Assessing or Millage Rollback Fraction	(9) Maximum Allowable Millage Levy *	(10) Millage Requested to be Levied July 1	(11) Millage Requested to be Levied Dec. 1	(12) Expiration Date of Millage Authorized
ALLOTTED Assigned <input checked="" type="checkbox"/>	Operating	2/20/79	1.0000	.9716	.9957	.9674	1.0000	.9674	.9674	.2262	unlimite
Extra Voted	Fire	8/05/08	.2272	.2272	.9957	.2262	1.0000	.2262	.2262	.2091	8/05/27
Extra Voted	Police	8/05/08	.2100	.2100	.9957	.2091	1.0000	.2091	.2091	.5058	8/05/27
Extra Voted	Fire	8/06/13	.5080	.5080	.9957	.5058	1.0000	.5058	.5058	.2480	8/05/34
Extra Voted	Police	8/06/13	.2491	.2491	.9957	.2480	1.0000	.2480	.2480	.1493	8/05/34
Extra Voted	Library	8/06/13	.1500	.1500	.9957	.1493	1.0000	.1493	.1493	.2290	8/05/24
Extra Voted	Open Space	11/04/08	.2300	.2300	.9957	.2290	1.0000	.2290	.2290	.5775	11/03/27
Extra Voted	Fire	8/03/04	.5800	.5800	.9957	.5775	1.0000	.5775	.5775		8/03/23

Prepared by <b>Roger Mc Carty</b>	Telephone Number <b>616 949 6176</b>	Title of Preparer <b>Assessor</b>	Date <b>11/ /2018</b>
--------------------------------------	---	--------------------------------------	--------------------------

**CERTIFICATION:** As the representatives for the local government unit named above, we certify that these requested tax levy rates have been reduced, if necessary to comply with the state constitution (Article 9, Section 31), and that the requested levy rates have also been reduced, if necessary, to comply with MCL Sections 211.24e, 211.34 and, for LOCAL school districts which levy a Supplemental (Hold Harmless) Millage, 380.1211(3).

<input checked="" type="checkbox"/> Clerk	Signature	Print Name	Date
<input type="checkbox"/> Secretary		<b>Susan Slater</b>	<b>11/ /2018</b>
<input checked="" type="checkbox"/> Chairperson	Signature	Print Name	Date
<input type="checkbox"/> President		<b>Robert Beahan</b>	<b>11/ /2018</b>

\* Under Truth in Taxation, MCL Section 211.24e, the governing body may decide to levy a rate which will not exceed the maximum authorized rate allowed in column 9. The requirements of MCL 211.24e must be met prior to levying an operating levy which is larger than the base tax rate but not larger than the rate in column 9.

\*\* **IMPORTANT:** See instructions on page 2 regarding where to find the millage rate used in column (5).

Local School District Use Only. Complete if requesting millage to be levied. See STC Bulletin 3 of 2018 for instructions on completing this section.	Rate
Total School District Operating Rates to be Levied (RH/Supp and NH Oper ONLY)	
For Principal Residence, Qualified Ag, Qualified Forest and Industrial Personal	
For Commercial Personal	
For all Other	





# CASCADE CHARTER TOWNSHIP

2865 Thornhills SE Grand Rapids, Michigan 49546-7140

**Date:** November 14, 2018  
**To:** Supervisor Beahan and Township Board Members  
**From:** Ben Swayze, Township Manager  
**Subject:** Cascade Charter Township Stormwater Master Plan

---

## **FACTS:**

In December 2015, the Township was awarded a Stormwater, Asset Management, and Wastewater (SAW) grant from the Michigan Department of Environmental Quality to update our Stormwater Management Plan (SWMP) that was originally adopted by the Township in 2007. The SWMP is a tool to assist the Township and residents in planning for improvement projects to protect and restore resources most impacted by stormwater.

The process for the development of the SWMP included the assessment of select open-channel storm drains, public and private best management practices and opportunities for regional stormwater detention. In addition, public education and operations and maintenance plans found in the Township's Municipal Separate Storm Sewer System (MS4) were also considered during SWMP development. At the meeting, Project Manager Cheryl Pitchford, engineer from Fishbeck, will have a presentation reviewing the contents of the plan

Attached for your review are:

- Draft Cascade Charter Township Stormwater Management Plan

## **ANALYSIS & CONCLUSIONS:**

The 2007 Cascade Charter Township Stormwater Management Plan and the Lower Grand River Watershed Management Plan were used to direct field investigations and identify impairments and water quality problems throughout the Township. No concerns with water quality were identified. However, sediment loading and unstable channel morphology, resultant from altered hydrology, is a substantial concern throughout much of the Township. Given site constraints, regulatory concerns, and costs, few opportunities exist for regional detention and/or retrofit of existing facilities.

Recommendations discussed include:

- Stream stabilization projects in six high-priority districts to restore channel morphology, reduce sedimentation, and protect riparian property.
- Biennial stream monitoring in eight districts to evaluate rate and extent of change in channel stability.
- Re-evaluate necessity for regional detention in two districts 3 to 5 years after stream stabilization projects have been implemented.

- Implement large-scale sustainable and low-impact design where feasible (i.e. roadside ditches and swales).
- Update stormwater ordinance to include more stringent requirements for redevelopment in priority watersheds.
- Coordinate with Michigan Department of Transportation and Kent County Road Commission to address concerns with impaired or undersized crossings.
- Encourage resident involvement in cursory assessment of watercourses to document concerns.
- Work with residents and the Kent County Drain Commissioner to designate priority watercourses as county drains.
- Continue active participation with MS4 communities within the Lower Grand River Watershed.
- Allocate funding in the Township's Capital Improvement Plan to implement recommendations.

The plan was reviewed by the Infrastructure Committee at their November 2018 meeting, and they have recommended that the Township adopt the Stormwater Management Plan

**FINANCIAL CONSIDERATIONS:**

The adoption of the Stormwater Management Plan itself has no financial ramifications. The plan does recommend future financial investments in the Stormwater systems of the Township.

**RECOMMENDED ACTION:**

Adopt the Cascade Charter Township Stormwater Management Plan

# Cascade Charter Township Stormwater Management Plan

Michigan Department of Environmental Quality  
Stormwater, Asset Management, and Wastewater  
(SAW) Grant 1142-01

**REVIEW DRAFT**

Project No. 130708  
November 2, 2018



Fishbeck, Thompson, Carr & Huber, Inc.  
engineers | scientists | architects | constructors

ftc&h



## **Cascade Charter Township**

### **Stormwater Management Plan**

# **Michigan Department of Environmental Quality Stormwater, Asset Management, and Wastewater (SAW) Grant 1142-01**

**Prepared For:  
Cascade Charter Township  
Grand Rapids, Michigan**

**November 2, 2018  
Project No. 130708**

***Review Draft***



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## List of Abbreviations/Acronyms

BMPs	Best Management Practices
CIP	Capital Improvement Plan
Committee	Cascade Charter Township Infrastructure Committee
CQSA	Citizens Qualitative Stream Assessment
EPA SWMM	Environmental Protection Agency Stormwater Management Model
GHM	Good Housekeeping and Pollution Prevent Best Management Practices Manual
H&H	hydrologic and hydraulic
HSG	Hydrologic Soil Group
KCDC	Kent County Drain Commissioner
KCRC	Kent County Road Commission
LGWMP	Lower Grand River Watershed Management Plan
Manual	MS4 Stormwater Design Criteria and Stormwater Ordinance manual
MDEQ	Michigan Department of Environmental Quality
MDOT	Michigan Department of Transportation
MS4	Municipal Separate Storm Sewer System
NRCS	National Resource Conservation Service
Ordinance	2008 Cascade Charter Township Stormwater Ordinance
Plan	2007 Cascade Charter Township Stormwater Management Plan
PEP	public education program
REGIS	Regional Geographic Information System
SAW	Stormwater, Asset Management and Wastewater
SWMP	Stormwater Management Plan
Township	Cascade Charter Township

DRAFT

## 1.0 Executive Summary

---

Cascade Charter Township (Township) is in Kent County and has a population of approximately 18,800 according to the 2016 US Census Bureau data. Located in the Lower Grand River Watershed, the Township encompasses 34.8 square miles. The Thornapple River and Grand River receive all the Township's stormwater, support a diverse aquatic and wildlife population, and offer residents a wide-variety of recreational opportunities.

Stormwater is conveyed through a network of municipal storm sewer and open channels. Approximately 246,000 lineal feet of public and private storm sewer, ranging from 2-inch to 60-inch diameter, 1,677 catch basins, and 952 manholes exist in the Township, but are not under Township jurisdiction. Approximately 298 culverts and 424,100 lineal feet of open channel carry stormwater to either the Thornapple or Grand Rivers. A total of 80 public and private best management practices (BMPs) are found in the Township, including detention and retention facilities, with the Township having jurisdiction over 2.

Over the past 20 years, protection and restoration of natural resources impacted by stormwater has been an increasing priority for the Township and its residents. In December 2015, the Township was awarded a Stormwater, Asset Management, and Wastewater grant from the Michigan Department of Environmental Quality for development of a Stormwater Management Plan (SWMP). The SWMP will assist the Township and residents in planning for improvement projects to protect and restore resources most impacted by stormwater.

During development of the SWMP, select open channels, public and private BMPs, and opportunities for regional detention were assessed. Municipal stormwater components were not evaluated, as they are not under the Township's jurisdiction. Public education and operations and maintenance plans found in the Township's Municipal Separate Storm Sewer System (MS4) were also considered during SWMP development.

The 2007 *Cascade Charter Township Stormwater Management Plan* and the Lower Grand River Watershed Management Plan were used to direct field investigations and identify impairments and water quality problems throughout the Township. No concerns with water quality were identified. However, sediment loading and unstable channel morphology, resultant from altered hydrology, is a substantial concern throughout much of the Township. Given site constraints, regulatory concerns, and costs, few opportunities exist for regional detention and/or retrofit of existing facilities.

Recommendations discussed include:

- Stream stabilization projects in six high-priority districts to restore channel morphology, reduce sedimentation, and protect riparian property.
- Biennial stream monitoring in eight districts to evaluate rate and extent of change in channel stability.
- Re-evaluate necessity for regional detention in two districts 3 to 5 years after stream stabilization projects have been implemented.
- Implement large-scale sustainable and low-impact design where feasible (i.e. roadside ditches and swales).
- Update stormwater ordinance to include more stringent requirements for redevelopment in priority watersheds.
- Coordinate with Michigan Department of Transportation and Kent County Road Commission to address concerns with impaired or undersized crossings.
- Encourage resident involvement in cursory assessment of watercourses to document concerns.
- Work with residents and the Kent County Drain Commissioner to designate priority watercourses as county drains.
- Continue active participation with MS4 communities within the Lower Grand River Watershed.
- Allocate funding in the Township's Capital Improvement Plan to implement recommendations.

## 2.0 Introduction

Cascade Charter Township (Township) is approximately 34.8 square miles (22,272 acres) and is situated in the southeastern region of Kent County, approximately ten miles southeast of Grand Rapids. The Thornapple River is a significant feature of the township, as it divides the township into east and west halves; however, the most northeast portion of the Township is directly adjacent the Grand River. Nestled in the greater Lower Grand River Watershed, features often associated with riverine valleys are found throughout much of the Township, including but not limited to wetlands, forested floodplains, lakes, and waterways. Majority of the Township is urbanized and includes large areas of impervious surfaces, contributing to flashy hydrology within the drainage systems.

Almost all the Township has experienced substantial changes from pre-settlement conditions. Natural areas, including but not limited to wetlands, floodplains, forests, and watercourses have been removed or altered to accommodate both residential and business development in the Township. These alterations have resulted in substantial changes in hydrology. In response to the altered hydrology, once stable watercourses have become unstable as natural stream processes work to achieve equilibrium with current hydrologic conditions. Erosion within steep ravines in close proximity to residential property is also becoming increasingly problematic. Concerns with streambank erosion, sedimentation, flooding, loss of aquatic habitat and riparian property, and adequate conveyance of stormwater has presented concern for both residents and the Township.

## 3.0 Project Background

Beginning in the early 2000s, focus on stormwater management at both the County and Township levels became a priority. A county-wide stormwater management strategy, supported by the Kent County Drain Commissioner (KCDC), was adopted in 2003 and required Townships develop and update their stormwater management plans (SWMP) every ten years. The *Cascade Charter Township Stormwater Management Plan* (Plan) was prepared in February 2007 to satisfy requirements of the 2003 county-wide initiative, and this report will serve to satisfy the required 10-year update.

Since Plan development, significant strides have been taken to ensure proper management of stormwater, protection of resources, and increase public awareness and education. The Township's stormwater ordinance specifically outlines stormwater management criteria and requirements for development and redevelopment of properties. Three stormwater management zones have been established, based on development potential, open area, soil type, and utility availability, to set stormwater control performance standards for developments, Figure 1. Summary of stormwater management zone characteristics is provided in Table 1 below.

**Table 1 – Stormwater Management Zone Characteristics**

Zone	Impervious Surface	Primary Land Use	Existing Stormwater Facilities*	Zone Goal	Preferred BMPs
A	Very little	Residential and rural residential	29	Preserve natural condition of water bodies	Infiltration required
B	Significant	Developed	31	Prevent further destabilization of downstream areas; maintain water quality	Detention ponds, buffer strips
C	>25%	Highly urbanized	0	Reduce and control sedimentation	Sediment basin, buffer strips

\*Includes both public and private basins

In 2009, the Township Board adopted an implementation plan to allocate funding and begin implementing recommendations for addressing stormwater concerns and deficiencies noted in the 2007 Plan. Deficiencies identified in the 2007 Plan and outside of the Township’s jurisdiction (i.e.: concerns with designated county drains, roads, and state infrastructure) were provided to respective agencies to allow for maintenance activities to address known impairments. As a result, maintenance activities have been conducted on five watercourses under the jurisdiction of the KCDC to address concerns.



*New catch basin installation - Thornapple Hills Drain (Sentinel drainage district) February 2017*

The Township is also proactively addressing known areas of concern, to the greatest extent possible, to restore channel stability and address streambank erosion, and sedimentation resultant from flashy hydrology and uncontrolled stormwater runoff (i.e.: damaged pipes and outfalls). Specifically, a stream rehabilitation project was completed on the Thornapple Hills Drain, located in Sentinel drainage district, in 2017. Work activities, including but not limited to, installation of a catch basin, outlet pipes, rock spillways, and other practices were implemented to stabilize eroding streambanks and reduce sediment loading to the watercourse. Preliminary planning and design are currently underway to restore floodplain connectivity and reduce streambank erosion in Schoolhouse Creek. Most notably, increased public awareness regarding their role in stormwater management has been realized through implementation of initiatives identified in the collaborative public education program (PEP) developed for regulated communities within the Lower Grand River Watershed.

### 3.1 Municipal Separate Storm Sewer System (MS4)

It should be noted that the Township’s Municipal Separate Storm Sewer System (MS4) permit is also currently under review by the Michigan Department of Environmental Quality (MDEQ) and will supersede the 2003 county-wide stormwater initiative once approved. An SWMP was prepared as part of the MS4 permit and provides the Township with procedures and standards to reduce pollutant discharge from the MS4 to the maximum extent possible. The MS4 SWMP provides for collaborative policies and procedures, and implementation of the same, for public participation and education, illicit discharge elimination program, construction and post-construction stormwater runoff control program, and good housekeeping for regulated communities within the Lower Grand River Watershed.

In addition, to meet Section 402 of the Federal Clean Water Act, as amended for nonpoint source discharge elimination for MS4 communities, update of the Township’s, and all MS4 communities’, stormwater ordinances and design criteria became necessary. As a result, the MS4 Stormwater Design Criteria Manual and Stormwater Ordinance (Manual) was produced by Grand Valley Metropolitan Council to update and unify site plan review procedures to meet post-construction controls for MS4 communities within west Michigan. The collaborative process for manual development began in April 2014 and is currently being reviewed by the MDEQ for final approval, which is anticipated to occur sometime in 2018. Upon MDEQ approval, the Township will be updating its design criteria and stormwater ordinance in accordance with the Manual.

Despite the significant progress that has been made by the Township to properly manage stormwater, stability of watercourses previously impacted by stormwater remains a concern.

## 4.0 Project Purpose

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The SWMP will serve as a roadmap for the Township to plan for and implement key initiatives to address historic impacts from stormwater runoff, including but not limited to altered channel morphology and streambank erosion. It will identify prioritized projects and cost estimates for Capital Improvement Planning (CIP) purposes. Also, the SWMP will provide the Township with a prioritized inventory of known drainage deficiencies, make recommendation for proactively addressing future concerns, and serve as a tool for collaborating with the KCDC and Kent County Road Commission (KCRC). The SWMP will evaluate feasible and prudent upland Best Management Practices (BMPs) to reduce peak flow to impaired channels. Lastly, the SWMP will evaluate opportunities for incorporating regional detention within the Township.

## 5.0 Project Objectives

---

Implementation of this SWMP will seek to accomplish the following objectives:

- Identify and prioritize impaired watercourses
- Reduce sediment load to the Thornapple River and Grand River
- Ensure funds are allocated on an annual basis (CIP) for stormwater improvement and restoration initiatives
- Improve water quality and aquatic and fisheries habitat through reduced sediment loading
- Establish a procedure for monitoring drainage districts
- Increase public awareness for stormwater management responsibility
- Ensure public health and safety and protection of riparian property
- Partner with state and local agencies to address known deficiencies
- Prioritize high priority streambank stabilization projects
- Provide recommendations for regional detention opportunities

## 6.0 Township Characteristics

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### 6.1 Watershed Boundaries

The Township is situated in the heart of the Lower Grand River Watershed, and has three major watersheds, Figure 2. The Grand River watershed drains the most north-eastern quadrant of the Township, Plaster Creek drains the western side of the Township, and the Thornapple River drains the central region of the Township. Each of the three watersheds vary in size and land use and are described below.

#### 6.1.1 Grand River Watershed

One hundred percent of stormwater runoff in this watershed originates specifically in the Township and is directly discharged to the Grand River. The watershed encompasses the northeast 2,756 acres (12%) of the Township.

#### 6.1.2 Thornapple River Watershed

The majority of the stormwater originates within Township boundaries. However, stormwater adjacent to the south and east boundaries of the Township originates in neighboring Townships. This is the largest watershed, as it covers the central 16,243 acres (73%) of the Township.

### 6.1.3 Plaster Creek Watershed

Stormwater flow in the northern segment of the watershed originates both from within the Township and from neighboring Ada Township. North of I-96, these stormwater flows move southward through the Martin and Beak Drain and into the City of Kentwood just south of I-96. South of I-96, stormwater originates within the Township and flows eastward into the City of Kentwood at various locations. All the water from this watershed flows through the City of Kentwood and into Plaster Creek. This watershed is comprised of the western 3,315 acres (15%) of the Township.

## 6.2 Drainage Districts

Thirty-seven drainage districts, ranging from 99 to 2,496 acres in size, were delineated within the three major watersheds in the Township. Drainage districts within the smallest watershed, Grand River, average 344 acres in size. Plaster Creek drainage districts average 552 acres in size. Drainage districts within the Thornapple River watershed, the largest in the Township, average 706 acres in size. Details regarding drainage district size are provided in Table 2. Figure 3 depicts each drainage district and its primary drainage path.

**Table 2 – Drainage District Summary**

Grand River Watershed		Thornapple River Watershed		Plaster Creek Watershed	
Drainage District	Acreage	Drainage District	Acreage	Drainage District	Acreage
Cascade East	293	Alaska	99	60th Street	292
Crestwood Hills	725	GRFIA Northeast	316	Cascade West	1,716
Grand River One	345	Cascade Road	930	GRFIA Northwest	303
Grand River Two	272	Cascade Southeast	2,496	GRFIA Southwest	434
Highgrove	516	Cascade Woods	213	Kendrick	117
Platinum Falls	167	Forest Creek	180	Meadowbrooke	453
Shadlow Trail	276	Burger 1	188		
Thornapple Club	162	Burger 2	1,468		
		GRFIA Southeast	1,580		
		Hidden Hills	443		
		M-6 Interchange	204		
		Maracaibo Shores	773		
		Middle Thornapple	817		
		North Thornapple	1,495		
		Quiggle Lake	759		
		Ridgewood Creek	284		
		Schoolhouse Creek	2,155		
		Sentinel Pointe	267		
		South M-6	180		
		South Thornapple	523		
		Sturbridge	530		
		Tammarron North	230		
		Tannon	113		
<b>Total</b>	<b>2,756</b>	<b>Total</b>	<b>16,243</b>	<b>Total</b>	<b>3,315</b>

## 6.3 Land Use

A wide variety of land use exists throughout the Township, as shown in Figure 4. Dense residential and commercial uses comprise the majority of the northern and southern central portion of the Township. The

majority of undeveloped and natural areas generally exist in the northern region of the Township. Review of pre-settlement conditions, indicates a loss of approximately 14,500 acres of forested land because of growth within the Township.

## 6.4 Wetlands

Due to the highly urbanized nature of the Township, only 7.5% of the Township is classified as wetlands by the National Wetlands Inventory conducted by the United States Fish and Wildlife Service, Figure 5. Alteration or loss of wetland area is most notable in the central portion of the Township, where dense residential and commercial areas exist. Generally, small to medium size wetlands are scattered throughout the outer limits of the Township, while few large wetland complexes exist at all. Preservation and protection of remaining wetlands is important, as they provide a natural means for stormwater storage and water quality treatment.



Schoolhouse District

## 6.5 Soils

Soils in the Township have been classified by the National Resource Conservation Service (NRCS) of the U.S. Department of Agriculture. A total of 60 mapped soils exist within the Township and are shown in Figure 6. Soil types can be generalized as representing sand, loamy sand, sandy loam, loam, silty loam, gravel, muck, and urban modified soils. Most of the Township (47%) consists of loamy soils.

## 6.6 Hydric Soils

Understanding the hydrologic characteristic of soils is necessary to calculate potential stormwater runoff from an area and potential flooding. Clay soils have lower infiltration resulting in larger runoff volumes and higher flood discharges. Conversely, sandy soils have higher infiltration rates resulting in less runoff and lower flood discharge rates. Runoff potential for soil has been classified as A, B, C, or D by NRCS using the Hydrologic Soil Group (HSG) classification. Figure 7 depicts HSG data from the NRCS Soil Survey Geographic database. The HSG classification is based on the water infiltration capacity of the soil after wetting from long-duration storms and opportunity for swelling. Characteristics of the four HSG classifications are shown in Table 3, below.

Table 3 – HSG Soil Characteristics

HSG Group	Infiltration Rate	Soil Depth	Water Transmission Rate	Soil Texture
A	High	Deep	High	Sand, gravelly sand
B	Moderate	Moderately Deep	Moderate	Moderately fine to moderately coarse
C	Slow	Moderately Shallow	Slow	Coarse
D	Very Slow	Shallow	Very slow	Clay, clay pan

Hydric soils may or may not have a dual HSG designation. A dual designation, A/D, for example, is a soil that behaves like an A or D soil depending on artificial drainage. Type A and B soils are prevalent throughout the Township and offer excellent opportunity for reduction in runoff from development and infiltration basins. However, due to the low cohesion properties of these soil types, potential for erosion is very high.

## 6.7 Streams, Rivers, and Floodplain

Approximately 100 watercourses of varying size are found throughout the Township, with 14 being under the jurisdiction of the Kent County Drain Commissioner. Notably, 21 watercourses discharge directly to the Thornapple River, while 5 discharge directly to the Grand River. Watercourses and floodplains are shown on Figure 8. Many of the watercourses flow through steep sandy ravines and are highly unstable. Most of these watercourses are extremely flashy as storm pipes discharge directly into ravine systems at multiple locations, which has resulted in significantly altered channel morphology and extensive streambank erosion.



*Schoolhouse Creek*

## 6.8 Stormwater System

The stormwater conveyance system is comprised of a municipal stormwater collection system, primarily in the central and northwestern regions of the Township, open watercourses, ditches, and public and private detention/ retention basins for storage and/or controlled release of stormwater. The stormwater collection system consists of a network of storm sewer pipes, catch basins, and manholes. Stormwater systems on public roads are owned and operated by the KCRC, while private development is responsible for systems on private roads. The length of public and private pipe in the Township is approximately 240,600 LF (45.6 miles). In addition, there are 1,677 catch basins and 952 manholes in the system. Coupled with the storm sewer system, 424,100 LF (80.3 miles) of open watercourses, scores of ditches, along with the Thornapple and Grand Rivers, and 298 culverts aid in stormwater conveyance. The stormwater system is shown on Figure 9, while culverts identified in the Plan are shown in Figure 10.

## 6.9 Public and Private BMPs

A total of 80 public and private stormwater facilities exist within the Township to aid in controlled release of stormwater, and are shown on Figure 9. Table 4 depicts number, type, and owner of facilities.

**Table 4 – Public and Private BMPs**

Owner	Detention	Retention
Township	2	
Kent County Drain Commissioner	31	
Private (developers)	27	20
<b>Total</b>	<b>60</b>	<b>20</b>



*Private detention basin – Schoolhouse District*

Pursuant to the Township's 2008 Stormwater Ordinance (Ordinance), developers of privately owned facilities are responsible for routine, emergency, and long-term maintenance of facilities. In the event facilities are not maintained, the Ordinance authorizes the Township to conduct maintenance activities at the developer's expense. The KCDC inspects, repairs, and maintains facilities pursuant to its internal maintenance schedule. The Township assumes responsibility for care and maintenance for the two basins under its jurisdiction.

## 7.0 State and Local Agency Collaboration

A letter was sent in March 2016 to state and local agencies (Michigan Department of Transportation [MDOT], KCRC, and KCDC) informing them of the development of this SWMP. The letter outlined goals and objectives of the SWMP and procedures for communicating the outcome of the SWMP. A project progress meeting was held March 2017 with the KCDC to review priority watercourses and areas of impairment throughout the Township. Opportunities for petitioning the KCDC to establish jurisdiction over impaired watercourses was discussed and favorably received. During this meeting, a collaborative partnership for inspecting stormwater facilities under the jurisdiction of the KCDC was developed between the Township and KCDC. Under the agreement, the Township will inspect KCDC stormwater management facilities and provide inspection results to the KCDC. This partnership leverages resources resulting in more frequent inspections, and implementation of corrective measures for the 31 facilities KCDC is responsible for throughout the Township.

## 8.0 Areas of Concern

There are no known areas of significant flooding, impaired water quality, or pollutant loading in the Township. However, minor flooding has been known to occur because of sedimentation and a broken outlet in the Santiago detention basin, located in Schoolhouse Creek drainage district. Residents along Schoolhouse Creek have also expressed concern with erosion, sedimentation, and changes in channel morphology because of flashy hydrology resultant from hydrologic changes. The Township is currently partnering with residents to develop a restoration plan to restore Schoolhouse Creek. In addition, residents have noted impaired navigability in Thornapple Hills Drain Bayou (Bayou). As previously stated, in 2017, work activities were conducted in Thornapple Hills Drain to address source and cause of sediment loading to the greatest extent possible. A petition to dredge the Bayou to restore navigability has been filed by residents with the Township.

Many of the open channels and ravines throughout the Township are also experiencing varying levels of impairment, including bank erosion, sedimentation, and impairments to fisheries and aquatic habitat, as a result of stormwater runoff. Specifically, residents have expressed concern with erosion, sediment loading, and ravine stability in the Cascade Woods and Burger 1 districts.

Review of the Plan's culvert hydrologic and hydraulic calculations notes seven culverts are undersized for either the 10 or 25-year storm event, resulting in flooding of roads, lawns, channel scour, and erosion. In addition, one undersized culvert was observed during the 2016 windshield survey. Accumulation of sediment in four culverts is also adversely impacting capacity, as noted in the Plan.

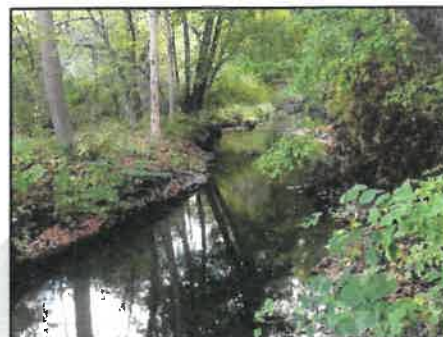
The Lower Grand River Watershed Management Plan (LWMP) notes concern with nitrogen, phosphorus, and sediment loading within the Lower Thornapple River sub-district, but does not specifically identify the sources and causes of pollutants relative to the Township. Identifying specific sources and causes of these pollutants is out of the scope of this SWMP. In addition, the LWMP identifies Lower Thornapple River as a medium and low priority for areas needing preservation, protection, and restoration respectively.



*Private undersized culvert - Sturbridge District*

## 9.0 Stormwater System Assessment

Assessment of the stormwater system consisted of a windshield survey of open channels within 23 of 37 drainage districts to evaluate stream instability and responses to stormwater. Assessment of structural BMPs was also conducted to identify structural integrity, function, maintenance needs, and potential opportunities for retrofit. Condition of storm sewer pipes was not part of the assessment as they are not under the jurisdiction of the Township. Detailed inspection of culverts was also not conducted, as information from the Plan was reviewed and determined appropriate. Specifically, the Plan notes visual inspection and analysis was conducted for 66 of the 298 culverts within the Township. Concern with structural integrity, capacity, or physical degradation was observed for 40 of the 66 culverts. This information was shared with responsibility agencies for maintenance and potential upsizing of culverts, as necessary.



*McCord's Creek – Cascade Southeast*

### 9.1 Methodology

Review of the Plan's priority districts, district development potential, and aerial photography to identify stability of open watercourses within the district and land use changes was conducted to select districts for the windshield survey and analysis. A total of 23 of the 36 districts were selected for windshield survey, Figure 11. The windshield survey consisted of field verification of channel conditions approximately 1,000 lineal feet upstream and downstream of one or more road crossings for the watercourse in the district. Detailed inspection of the entire stream was determined not necessary, as the noted assessment area provided adequate information for the goals of the SWMP. (Detailed inspections of the stream will be conducted as projects are authorized). Streambank erosion, threats to riparian property (buildings and structures), sedimentation, overall channel stability, floodplain connectivity, pipe outfalls, and obstructions to conveyance were evaluated during the windshield survey. Typical impairments were photographed, and preliminary BMPs were identified to address observed impairments.

Field verification of select structural BMPs was also conducted during the windshield survey, noting concerns with structural integrity, maintenance needs, and potential opportunities for retrofits to improve capacity.

The 23 districts were priority ranked based on severity of noted deficiencies. Preliminary BMPs were identified to address 6 high-priority districts. Five high-priority channels were videorecorded to document impairments, channel conditions, and provide a basis for evaluating changes in channel morphology. Schoolhouse Creek was not videorecorded, as preliminary project design has already been completed to address impacts from stormwater.

### 9.2 Results

Based on the windshield survey, drainage deficiencies and channel impairments were observed within 13 of the 23 districts, as shown in Figure 11. Channel impairments, including but not limited to streambank erosion, channel downcutting/headcutting, sedimentation, unstable meander pattern, poor to very poor floodplain connectivity, log jams, and other obstructions were noted at varying degrees throughout the 13 districts. Only one watercourse is under the jurisdiction of the KCDC. Photographs of typical impairments observed in the 13 districts are provided in Appendix 1. Alterations in channel morphology and instability were observed as ranging from mild to severe and are a result of altered hydrology and stormwater runoff. Six high-priority districts were noted with severely degraded watercourses:

- Burger 1
- Burger 2
- Cascade Woods
- Quiggle Lake
- Schoolhouse Creek
- Tammarron North

Opportunities for new detention basins or retrofit of existing basins were investigated for each of the six high-priority districts to reduce stress on watercourses within the districts. Notably, Schoolhouse Creek District has two existing basins which were specifically evaluated for retrofit or maintenance and one location that was evaluated for a possible new detention basin that would help to address property owner concerns in the downstream areas of the District. Prior to making recommendations for work activities, detailed analysis was conducted for each basin and is summarized below. It should also be noted that many natural areas (wetlands) exist within the Township and are currently providing natural stormwater detention. Given development within the Township, few opportunities exist for constructing regional detention areas.

## 10.0 Culvert Hydrologic and Hydraulic Analysis

Detailed culvert hydrologic and hydraulic (H&H) analysis was completed with the Plan and is being used as the basis for development of this SWMP, as no new culverts are known to have been installed, upsized, or maintained since Plan development. The Plan’s H&H calculations were performed using methods outlined in the MDEQ document *Computing Flood Discharges for Small Ungaged Watersheds* on 40 road-crossing culverts known to have potential capacity problems or physical degradation. Seven culverts were determined undersized based on predicted roadway flooding for the 10 and 25-year event. Additionally, one culvert was identified in the Sturbridge District during the 2016 windshield survey as potentially being undersized, although no detailed H&H was conducted, as residents did not express concern regarding the private crossing. Table 5 summarizes the Plan’s computed headwater elevations as compared to the road crossing surface elevations for districts with known undersized culverts for the 10 and 25-year events.

**Table 5 – Culvert Headwater Elevations**

District	Crossing Location	Road Elevation	Headwater Elevation		
			10-year	25-year	100-year
Cascade Road	Cascade Road (850 feet east of Buttrick Avenue)	97.90	98.00	98.20	98.50
Burger 1	Forest Valley Drive	105.92	102.80	106.00	106.10
Sentinel Pointe	Thornapple River Drive	105.54	105.70	105.80	106.10
Quiggle Lake	36th Street	103.52	103.60	103.70	103.90
Schoolhouse Creek	Burton Street	102.27	100.6	102.40	102.70
	Driveway: 6629 Cascade Road	100.35	100.40	100.90	101.70
	Driveway: Cascade Fellowship Church	102.34	100.30	102.70	103.4

The Plan notes conveyance and capacity is also being adversely impacted by sedimentation in four culverts. Table 6 depicts culverts that are at least 10 percent plugged with sediment and were recommended for clean out in the Plan. Communication with respective agencies indicated maintenance activities have not yet occurred on the culverts.

**Table 6 – Culverts Plugged with Sediment**

Agency	District	Culvert Location
MDOT	Cascade Road	I-96
KCRC	GRFIA Northeast	48th Street
KCRC	Highgrove	Grand River Drive
KCRC	Sentinel Pointe	Heathmoor Court

## 11.0 Stormwater Detention Analysis

### 11.1 Regional Detention

Regional detention facilities are designed to provide stormwater management for multiple parcels or developments within a designated area/region. There are many advantages for incorporating regional detention, including but not limited to flood control, channel protection, improved water quality, safety, and aesthetics. Also, economies of scale can be achieved as one regional stormwater pond is constructed versus many smaller ponds. Use of regional detention can be most effective in areas where site constraints prohibit onsite stormwater management. However, regional detention can quickly become cost-prohibitive for ponds when servicing relatively small areas given land and easement acquisitions that are often required and construction costs.



*Cascade Lakes detention*

The Plan identified potential regional detention areas, however all the areas were existing ponds and lakes, many of which had limited opportunity for additional capacity. Therefore, this SWMP focused on identifying and assessing regional detention areas, excluding use of existing ponds or lakes. The Plan also recommended regional detention for seven districts; however, during development of this SWMP, it was determined regional detention was no longer a feasible option for four of the seven districts.

A total of five districts were analyzed for regional detention based on impairments noted during the windshield survey. Within the six high-priority districts, six sites were investigated for possible new detention basins, and four existing detention basins were reviewed for possible retrofit and maintenance to improve existing capacity. Field investigations and GIS analysis (using aerial imagery, contours, and storm sewer networks) were completed for all 10 locations. In addition, SWMM models were constructed for 5 of the 10 detention opportunities. Figure 11 shows the locations of the investigated improvements.

### 11.2 Roadside Ditches and Swales

Notably, roadside ditches and/or swales do not exist throughout residential areas within the six high priority districts. As such, large amounts of stormwater discharge into storm sewer systems, and ultimately open channels, with no opportunity for infiltration or detention. Site constraints in the six high priority districts prohibit construction of regional or onsite detention. Therefore, opportunities to reduce peak flow discharge through installation of roadside ditches and/or swales was also evaluated in residential areas.

## 11.2.1 Detention and Roadside Ditch/Swale Opportunities Modeled in SWMM

### 11.2.1.1 Methodology

A dynamic rainfall runoff routing hydraulic model was created using the Environmental Protection Agency’s Stormwater Management Model (EPA SWMM) modeling software to examine the possible benefits of regional stormwater detention, retrofit of existing detention basins, and the construction of roadside ditches, all of which aim to reduce stress on degraded watercourses within Cascade Township. The model has two key components: hydrology, which simulates the rainfall runoff to the point where it enters either a defined waterway or a storm sewer, and hydraulics which simulates flows within defined waterways and storm sewers. Hydrologic data including aerial imagery, hydrologic soil groups, contours, and sub-watershed drainage delineations was obtained from Cascade Township’s Regional Geographic Information System (REGIS) database. The SCS Type II 24-hour distribution was used to model rainfall intensity over time. Hydraulic data including pipe inverts, rim elevations, pipe materials, lengths, and slopes was also obtained from REGIS. The primary focus of the stormwater models was the reduction of peak flow for the 2-year event, as the smaller, more frequent events are the most significant contributor to erosion in smaller streams.

### 11.2.1.2 Results – Detention Improvements

Estimated peak flow reductions in receiving watercourses as a result of new or improved stormwater detention/retention facilities are provided in Tables 7 and 8, below. Figure 11 depicts locations of potential new or improved facilities.

**Table 7 – Peak Flow Reductions for New Detention/Retention Facilities**

Detention Location	2-year Peak Flow Reduction (%) <sup>*</sup>	Location of Peak Flow Reduction
Cascade Woods (Alternative 1)	62	Unnamed watercourse at Cascade Woods Drive
Cascade Woods (Alternative 2)	9	Unnamed watercourse at Cascade Woods Drive
Cascade/Burton	7	Schoolhouse Creek at Cascade and Burton
Thornapple Centre Parking lot (Green Infrastructure)	0	Outlet of 30" RCP** from Thornapple Centre development

*\* Peak flow reductions were calculated for the entire upland watershed at a point immediately downstream of the potential regional detention location.*

*\*\* (RCP) reinforced concrete pipe*

**Table 8 – Peak Flow Reductions for Retrofit of Existing Structural BMPs**

Detention Location	2-year Peak Flow Reduction (%) <sup>*</sup>	Location of Peak Flow Reduction
Tammarron North Lake	3	Outlet of 24" RCP on south branch of unnamed watercourse
Thornapple Centre (Retrofit of Existing Basin)	1	Outlet of 30" RCP from Thornapple Centre development

*\* Peak flow reductions were calculated for the entire upland watershed at a point immediately downstream of the potential regional detention location.*

The highest anticipated reductions in peak flow were at the two potential new detention sites in the Cascade Woods district. The first Cascade Woods alternative represents a basin that would be constructed southeast of the existing riparian pond upstream of Cascade Woods Drive. The second alternative represents a smaller basin

that would provide treatment for stormwater discharging from the 24-inch RCP outlet from Cascade Terrace. Alternative 1 has a higher percent reduction as a much greater portion of the watershed area would drain to that basin. However, this alternative was not determined prudent due to extensive adverse impacts to existing wetlands in the area. The second potential location for detention in Cascade Woods does not have wetland vegetation within its footprint.

The Schoolhouse Creek potential detention site also showed a significant reduction in peak flow. The site is located at the northwest corner of Cascade and Burton Street and is anticipated to reduce 2-year peak flow in Schoolhouse Creek by 7%, which is significant for a watershed of its magnitude.

Stormwater detention/retention retrofit opportunities were considered in Tammarron and Schoolhouse Creek districts; however, they are not recommended given significant costs and minimal benefits to receiving watercourses. Retrofits considered in Tammarron North consisted of reducing the existing 12-inch outlet from the lake upstream of Tammarron Avenue to a 4-inch outlet, which would yield a 1% decrease in the 2-year peak flow. Costs associated with obtaining authorization, potentially including flooding easements, for raising water levels on the properties surrounding the lake were determined prohibitive. The existing detention basin at the Thornapple Centre development (Schoolhouse Creek district) was modelled for further restriction from a 4-inch outlet to a 2-inch outlet. The results estimated a 1% reduction in the 2-year peak flow for Schoolhouse Creek. Furthermore, installing green infrastructure, such as rain gardens or pervious pavement, was considered in a half-acre section of the north-most end of the Thornapple Centre parking lot. Assuming 100% infiltration for the half-acre rain garden, the EPA SWMM model predicted a negligible decrease in the 2-year peak flow, and a 0.1% reduction in stormwater volume to Schoolhouse Creek. These reductions in peak flow and volume do not justify the Township taking ownership of a portion of the Thornapple Centre property, especially since the development met the required stormwater regulations when it was constructed in 1993.

### 11.2.2 Peak Flow Reductions for Roadside Ditch/Swale

One of the six high-priority districts, Cascade Woods, was selected for modeling peak flow reduction achieved through installation of roadside ditches/swales. Cascade Woods was chosen as the model district as a base SWMM model had already been developed for the stormwater detention analysis in this district. Within Cascade Woods, ditches were modelled for a 6-acre residential sample area in the northern portion of the district. Model results from this sample area were then extrapolated throughout the district as well as to four other high-priority districts, including Tammarron North, Quiggle Lake, and Burger 1 and 2. Model results were not extrapolated for Schoolhouse Creek, as current project design is intended for instream improvements only.

**Table 9 – Peak Flow Reductions for Roadside Ditches and Swales**

Drainage District	2-year Peak Flow Reduction (%)*	Lineal Feet of Roadside Ditch/Swale
Cascade Woods	15.0	12,920
Tammarron North	31.0	8,130
Burger 1	26.0	13,560
Burger 2	3.8	17,520
Quiggle Lake	3.0	6,430

\* Peak flow reduction was estimated at the location of the storm sewer outfall.

### 11.2.3 Investigated Detention Opportunities (Not Modeled in SWMM)

Five locations were analyzed either for stormwater basin construction or for retrofit of an existing basin, but were not modeled due to known site constraints, costs, or regulatory concerns. Specifically, two sites in Burger 2

district, one site in Quiggle district, and two sites in the Schoolhouse District were evaluated but not modeled due to reasons previously stated.

Two locations in the Burger 2 district were investigated for possible new detention of stormwater upstream of the impaired portions of the Burger Drain. However, the steep slopes along the drain between I-96 and just upstream of 36th Street present significant design and construction challenges, making detention cost-prohibitive. To avoid impacts to steep slopes and reduce costs, in-line detention was considered. However, in-line detention is not favorably viewed by the MDEQ, and therefore is not a feasible option.

One location in the Quiggle Lake district southeast of 36th Street and Buttrick Avenue was also considered for detention but not modeled. Steep slopes and close proximity of homes made new detention downstream of Buttrick Avenue impractical; therefore, this location was not considered the best option for detention to reduce peak flows and stabilize the primary watercourse in the Quiggle Lake District. While a new offline detention basin is feasible at this location, the stormwater treated by the basin would primarily be runoff generated from agricultural and undeveloped land, rather than runoff generated from residential areas, which is the source of unmanaged stormwater and the cause of impairments in the watercourse.

Santigo Avenue and Bechalla Drive, the remaining two sites not modeled in EPA SWMM, are potential retrofits of existing KCDC detention basins within Schoolhouse Creek district. Residents near the Santigo Avenue basin have expressed concern regarding flooding of basements, which is more than likely a result of sediment accumulation and the buried high flow outlet in the basin. Removing sediment and restoring the basin to its design function was determined the most practicable and cost-effective approach for addressing resident's concerns, therefore EPA SWMM models were not constructed. Also, restricting the 12-inch low-flow outlet was determined not feasible as water elevations would be near to those currently causing flooding. The Bechalla Drive basin has an 8-inch low-flow outlet and has overtopped in the past two decades according to residents. Given no known concerns with flooding, and no opportunity for basin expansion, SWMM models were not constructed for this basin.

## 12.0 Recommendations

Proactively addressing known impairments will protect and restore natural resources to the greatest extent possible. A proactive approach to stabilize, monitor, and care for streams adversely impacted by historic stormwater is needed to assist both Township officials and residents to plan for and implement improvement measures. Furthermore, implementing green infrastructure to the greatest extent possible (swales, road side ditches, etc.) will work to effectively reduce peak flow in residential areas where regional detention facilities are not feasible. The following priority recommendations will serve as the Township's roadmap for addressing concerns with streambank erosion resultant from stormwater.

Summary of recommendations and implementation schedule for prioritized improvements are shown in Table 10, and include streambank stabilization, green infrastructure (when feasible), monitoring, and regional detention. Recommendations were prioritized based on the following:

- Intensity and scope of impairments
- Known resident concern
- Impact on resident property and resources
- Cost-benefit



*Sturbridge District*

**Table 10 – Recommendations Summary**

Drainage District	Activity	Calendar Year									
		2018	2019	2020	2021	2022	2023	2024	2025	2026	
<b>Streambank Stabilization and Green Infrastructure</b>											
Schoolhouse Creek	Easements, design, permitting		X								
	Construction		X								
Tammarron North	Solicit resident input		X								
Burger 1	Solicit resident input			X							
Quiggle Lake	Solicit resident input				X						
Cascade Woods	Solicit resident input					X					
Burger 2	Solicit resident input						X				
<b>Monitoring</b>											
Schoolhouse*	Post-construction				X	X	X	X	X		
8 Subdistricts**	Assessment		X		X		X		X		
<b>Regional Detention</b>											
Schoolhouse	Evaluate necessity				X						
Cascade Woods	Evaluate necessity					X					

\*Per MDEQ permit requirement

\*\*Sentinel Pointe, Forest Creek, GRFIA Southeast, Cascade Southeast, Cascade Road, Hidden Hills, Sturbridge, Highgrove

## 12.1 Stream Improvements

Six high-priority districts, including Schoolhouse Creek where project efforts are already underway, have been identified for streambank stabilization based on impairments observed during the 2016 field investigation and known resident concerns. Goals and objectives for stabilizing impaired watercourses are shown in Table 10. Stabilization projects can be designed to address either systemic or localized impairments, depending upon engineer recommendation, resident input, and available funding.

Incorporating natural channel design techniques is recommended to restore channel stability, maximize stream functions, improve water quality, and protect riparian property. Natural channel design will work to create much needed equilibrium between watercourses and their watersheds. Also, natural channel design techniques incorporate native materials which can help reduce project costs, and are more aesthetically pleasing than traditional engineering practices.

## 12.2 Sustainable and Low Impact Design BMPs

Installing vegetated road side ditches and swales in residential areas is an effective method to capture, convey, and infiltrate road runoff to reduce peak flows. Significant coordination and buy-in with KCRC, KCDC, and residents will be required for these measures, and construction costs could be significant. Viability for these techniques will more than likely need to be related to condition of road, planned road and utility improvements. In addition, use of porous pavements can be encouraged to mitigate and reduce peak flows. Encouraging residents to install BMPs rain gardens, bioswales, vegetative swales, and rain barrels is recommended to also help reduce peak flow to watercourses.

Specific BMPs recommended to meet stabilization goals and objectives are summarized in Table 11. Preliminary design (Schoolhouse Creek) and conceptual design for Tammarron North, Quiggle Lake, Burger 1, and Burger 2 are provided in Appendix 3.

**Table 11 – Stream Stabilization Goals and Objectives**

Goal	Stream Stabilization Objective										
	Increase residential and upland BMPs	Improve floodplain connectivity	Protect eroding banks	Create stable pattern	Energy dissipation	Stabilize storm outfall	Remove obstruction	Capture pollutant	Reduce flooding occurrences	Reduce sedimentation	Streambed diversity
Reduce Peak Flow	X										
Accommodate flashy hydrology	X	X	X		X				X	X	
Reduce streambank erosion	X		X	X	X	X	X		X	X	X
Reduce bed scour	X				X	X				X	X
Maintain/improve conveyance	X			X			X		X		
Improve water quality	X	X	X		X			X			
Improve aquatic habitat	X		X		X	X		X		X	
Protect riparian property	X	X	X	X	X	X	X		X	X	X
Reduce sediment load to Thornapple and Grand Rivers	X	X	X	X	X	X	X	X		X	X

**Table 12 – Stream Stabilization BMPs and Objectives**

BMP	Stream Stabilization Objective										
	Peak flow reduction	Improve floodplain connectivity	Protect eroding banks	Create stable pattern	Energy dissipation	Stabilize storm outfall	Remove obstruction	Capture pollutant	Reduce flooding occurrences	Reduce sedimentation	Streambed diversity
Floodbench		X	X		X			X	X	X	
Instream structure			X		X					X	X
Wood structure			X		X					X	X
Riffle			X		X						X
Step-pool complex			X		X						X
Plunge pool			X		X	X					X
Channel realignment			X	X						X	
Channel relocation			X	X						X	
Bar removal			X				X		X	X	
Remove log jams, debris			X				X		X		
Native plantings					X			X			
Bio-engineering			X					X			
Ditches/swales/Infiltration/ Detention basins/ raingardens	X		X			X		X	X	X	

It should be noted that open channels recommended for stream stabilization are currently not under the jurisdiction of the KCDC, therefore authorization from residents will be required prior to project initiation. Public meetings to inform residents of channel impairments, and opportunity for restoration project will need to take place. Public opinion can be solicited during the meeting to determine if stabilization project is desired, and should residents not desire stabilization measures be implemented, the Township can focus on other stormwater initiatives.

### **12.3 Monitoring**

Biennial monitoring of watercourses within 8 districts is also recommended to evaluate changes in impairment/stability, prioritize future improvement projects, and plan capital funding. (MDEQ post-construction monitoring is anticipated once work activities are completed for Schoolhouse Creek, as shown in Table 10). It is recommended the Township annually determine priority districts for monitoring based on known impairments and resident concerns. Monitoring activities should be completed by qualified individuals. Detailed monitoring protocol and procedures have been developed and are included in Appendix 2.

### **12.4 Regional Detention**

Considerations for implementing regional detention should only be considered after streambank stabilization projects have been implemented and outcomes monitored for three to five years to determine if regional detention is still necessary and/or beneficial.

### **12.5 Long-Term Maintenance**

Most of the water courses in the Township are not under the jurisdiction of the KCDC, and therefore no mechanism currently exists for conducting, or funding, emergency repair or routine maintenance work on these water courses. Petitioning the KCDC to designate priority watercourses as county drains should be considered to provide an avenue for funding and long-term care of watercourses. Establishing road side ditches as county drains will also provide funding for maintenance and care in perpetuity. Soliciting resident input will be a critical first step in the petition process, as permanent easements will need to be granted should a watercourse be designated a county drain.

### **12.6 Improvements to Existing Basins**

As noted above, little opportunity exists to retrofit existing basins and significantly reduce peak flow. However, it is recommended residents' concern with flooding and necessary maintenance, including but not limited to, dredging to restore capacity and restoration of outlet pipes for the KCDC-owned Santiago Street and Burton Street basins (Schoolhouse Creek district) be provided to the KCDC. It is also recommended that the Township continue collaborating with the KCDC to ensure basins are inspected and maintained in a proactive manner.

### **12.7 Improvements to Culverts**

A list of culverts identified in the Plan as requiring maintenance and/or upsizing should be redistributed to respective agencies (KCDC, KCRC, and MDOT). In addition, concerns with erosion and scour resulting from perched culverts at the Cascade Road crossing (Quiggle Lake District) and Cascade Springs Road crossing (Cascade Woods District) should also be provided to the KCRC.

### **12.8 State and Local Agency Collaboration**

Project collaboration and leveraging of resources is recommended between the Township, KCDC, KCRC, and MDOT to address known impairments and prevent further degradation of the Township's resources. Proactive planning and coordination amongst agencies can significantly reduce project costs as multiple agency-specific

work activities can be conducted as part of one greater project. For example, a KCRC road improvement project could incorporate road ditches/swales, repair of culverts, and stream improvements. Specific recommendations are outlined below:

- Provide summary report of utilities inventoried/inspected under the specific agency's jurisdiction
  - Report to include
    - Abstract summary of the SWMP
    - Map of utility
    - Photo documentation
    - Condition summary, including impacts to stormwater quality, conveyance, etc.
- Meet with respective agencies
  - Review findings and proposed actions in the SWMP for the utility under their jurisdiction
  - Work to develop a plan for implementing improvements, including funding strategy
  - Explore additional partnering opportunities to address stormwater issues
- Follow up
  - Annual follow up with agencies to determine accomplishments and roadblocks
  - Present new concerns as identified.

A working session was held on April 13, 2017, with the Cascade Charter Township Infrastructure Committee (Committee) to discuss preliminary findings and prioritize recommendations. The Committee met again on November 7, 2018, to review the final report and make decision whether to formally request funding from the Township Board to implement recommendations noted in the report. Presentation of the entire project and recommendations was presented to the Township Board on November 14, 2018.

## 12.9 Regulatory Considerations

Work activities impacting streams, wetlands, floodplain, and other regulated resources will require permits pursuant to the Natural Resources and Environmental Protection Act, Act 451, 1994, including but not limited to Part 301, Inland Lakes and Streams, Part 303, Wetlands, and Part 31 Floodplains and Floodways. Noteworthy regulatory changes have recently been implemented for work activities impacting regulated waterbodies. Many of these changes have the potential to increase project costs. As much of the recommended work in this plan involves improvements to watercourses, it is strongly recommended a thorough understanding of regulatory considerations is understood early in project development, as costs and project timing can be significantly impacted.

## 12.10 Public Education and Involvement

As previously noted, MS4 communities within the Lower Grand River Watershed have developed a collaborative and regional PEP, which was approved by the MDEQ in February 2013. The collaborative PEP allows MS4 communities to leverage resources, materials, and funding to enlighten residents as to how routine activities, such as fertilizing their lawn, can inadvertently introduce pollutants to water resources in their community. It is recommended the Township continues participating in the regional PEP program and serving as a member of the Lower Grand River Watershed's MS4 Community Stormwater Education Committee, which is responsible for implementation of the PEP.

The PEP strategy is structured around six stormwater education categories. Key messages, conveyance strategies, target audiences, and evaluations measures have been developed for each category listed below:

1. Personal watershed stewardship
2. Ultimate stormwater discharge location and potential impacts
3. Public report of illicit discharge

4. Personal actions impacting the watershed
5. Waste management assistance
6. Management of riparian lands

It is recommended the wide variety of brochures/flyers, newsletter articles, posters, kid’s coloring books, and other materials available from the PEP continue to be distributed throughout the Township. Links on the Township’s website provides additional resources, tools, and suggestions for residents to take an active role in managing stormwater and preventing pollution. Quarterly or bi-annual review and update of the website is recommended to ensure residents have up-to-date information and continue to be encouraged, informed, and charged with personal responsibility for watershed health and proper stormwater management.

Encouraging residents to complete the Citizens Qualitative Stream Assessment (CQSA) (Appendix 4) is also recommended. The CQSA is user-friendly and was designed to provide a “lay-man’s” evaluation of stream conditions, with the intent of increasing personal responsibility for stream and watershed health. It is recommended the Township request CQSA’s be completed when residents’ express concerns, including but not limited to streambank erosion, instability, poor water quality, and other impacts from stormwater. This information can be used by the Township and its engineer to help prioritize projects and monitoring activities.

Review of stormwater incentives (incentives) from a variety of municipalities across the United States was conducted to determine their applicability and benefit. After much consideration, it was determined that an incentive program was not suitable for the Township, and is therefore not recommended.

## 12.11 Operation and Maintenance Plan

The Good Housekeeping and Pollution Prevent Best Management Practices Manual (GHM), developed in cooperation with regulated (MS4) communities in the Lower Grand River Watershed, serves as the Township’s guide for inspecting and maintaining stormwater facilities within the Township. Procedures for inspecting and maintaining both structural and operational BMPs are provided in the GHM, and it is recommended the Township continue with current maintenance practices.

In addition to procedures outlined in the GHM, the Township has also taken measures to ensure proper maintenance of private stormwater management facilities. The Township’s 2008 Stormwater Ordinance includes standards which regulate control of stormwater runoff, including requirements for inspecting,

sampling, monitoring, and permitting of stormwater. The Ordinance provides for long-term accountability of private developers to maintain structural integrity and functionality of stormwater facilities, including a maintenance agreement recorded with the Kent County Register of Deeds. The maintenance agreement documents the developer’s pledge to provide routine, emergency, and long-term maintenance of the facilities, and authorizes the Township to maintain the facility, at the developer’s expense, should developer not adhere to terms of maintenance agreement.

As previously noted, a collaborative partnership for inspecting stormwater facilities under the jurisdiction of the KCDC was developed between the Township and KCDC. Inspection training sessions took place during spring/summer 2017, and Township staff have inspected select stormwater facilities. Procedures for formal documentation and communication of inspection results is recommended.



*Plugged catch basin – district unknown*



*Santiago Basin – Schoolhouse Creek District*

## 12.12 Stormwater Ordinance

The Township’s stormwater ordinance (Ordinance) plays a critical role for establishing minimum standards for proper stormwater management. Implementing more stringent requirements in the Ordinance is recommended for redevelopment in critical subwatersheds. Critical subwatersheds are identified as those having significantly to moderately impaired watercourses and have been recommended for a stream stabilization project or bi-annual monitoring. It is recommended that the Ordinance require development and redevelopment in these critical subwatersheds to meet pre-settlement conditions for channel protection.

In addition, the Township should update the stormwater ordinance in accordance with the West Michigan MS4 Stormwater Design Criteria Manual and Stormwater Ordinance when approved by MDEQ.

## 13.0 Cost and Funding

### 13.1 Costs

Table 13 depicts annual cost estimates for recommendations. Detailed cost estimates are not provided for the five high-priority streambank stabilization projects, as resident input and buy-in are required. Thornapple Hills Drain costs are based on actual construction, and Schoolhouse Creek cost estimate is based on actual preliminary design.

**Table 13 – Cost Estimate**

Year	Stream Stabilization							Monitoring		Total Cost Estimate by Year
	Thornapple Hills Drain*	Schoolhouse Creek**	Tammarron North^	Burger 1^	Quiggle Lake^	Cascade Woods^	Burger 2^	Schoolhouse Creek~~	8 Districts^+	
2017	\$182,461									\$182,461
2018										0
2019		432,000	\$3,000						\$10,000	\$445,000
2020				\$3,000				\$12,000		\$15,000
2021					\$3,000			\$10,000	\$10,000	\$23,000
2022						\$3,000		\$10,000		\$13,000
2023							\$3,000	\$10,000	\$10,000	\$23,000
2024								\$10,000		\$10,000
2025									\$10,000	\$10,000
<b>Project Total</b>	<b>\$182,461</b>	<b>\$432,000</b>	<b>\$3,000</b>	<b>\$3,000</b>	<b>\$3,000</b>	<b>\$3,000</b>	<b>\$3,000</b>	<b>\$52,000</b>	<b>\$40,000</b>	<b>\$721,461</b>

\*As constructed

\*\*Design, permitting, and construction

^Pre-project resident coordination

~~MDEQ monitoring requirements

^+Includes biennial cursory inspection of open channels in district. Written summary of findings, photographic documentation, and recommendations. Township to determine priority districts each year for monitoring based upon known impairments and/or resident concerns.

## 13.2 Funding

The Township will be responsible, at a minimum, for costs associated with soliciting resident input, to determine if residents desire implementation of recommendations, and biennial monitoring. It is recommended special assessment districts be established for funding streambank stabilization projects. It is unlikely funding through Clean Michigan Initiative or Great Lakes Restoration Initiative grants would be granted for recommended work, as work areas are not generally targeted priority areas for grant work (i.e.: direct tributary to a Great Lake).

Recommendations for annual funding will position the Township to implement recommended stormwater work activities:

1. Allocate approximately \$10,000 to be used for Petitioning for establishment of county drain on impaired watercourses, based upon resident input.
2. Allocate approximately \$5,000 to provide for public education regarding stormwater management.
3. Allocate approximately \$10,000 for soliciting resident input, including public meetings and preliminary data collection, regarding potential streambank stabilization projects.
4. Allocate approximately \$12,000 to provide for biennial monitoring of 8 districts.
5. Allocate approximately \$75,000 to perform streambank stabilization or stormwater management projects. Projects can be recognized through recommendations noted in Table 6 above or through a Petition submitted by residents. Potential projects shall be prioritized as follows:
  - a. Resident financial or in-kind service contribution
  - b. Extent and severity of impairments
  - c. Benefit to Township watershed health and impact on downstream areas
  - d. Accessibility to the project site
  - e. Availability of funds

# Figures

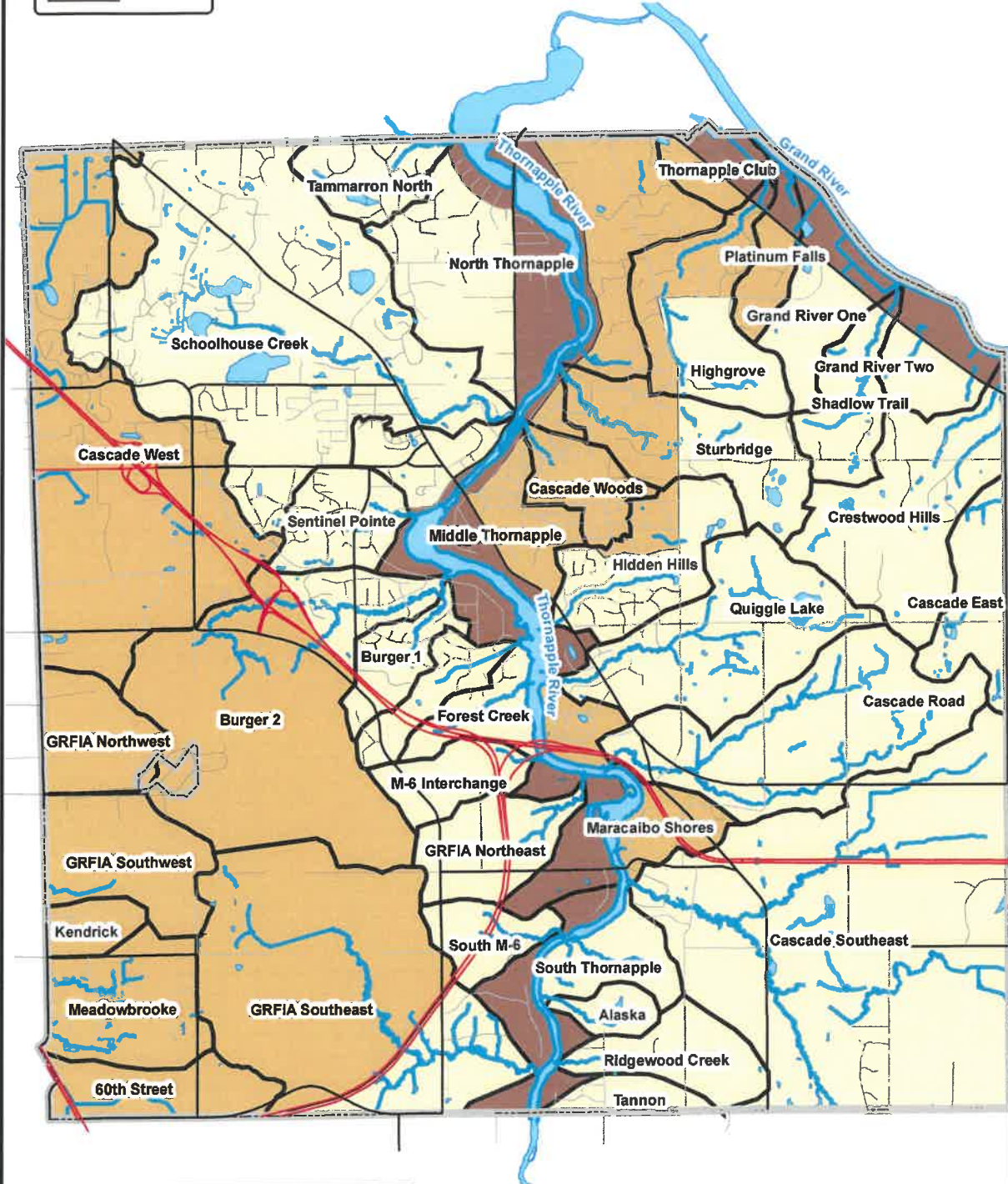
**Cascade Charter Township**

Kent County, Michigan

**Stormwater Management Plan**

**LEGEND**

- Zone A
- Zone B
- Zone C



**STORMWATER  
MANAGEMENT ZONES**



NORTH



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PROJECT NO.  
G130708SAW

FIGURE NO.

**1**

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**Cascade Charter Township**  
Kent County, Michigan

**Stormwater Management Plan**

PROJECT NO.  
G130708SAW

FIGURE NO.

**2**

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**LEGEND**

- Drains to Grand River
- Drains to Plaster Creek
- Drains to Thornapple River



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NORTH

**MAJOR WATERSHEDS**



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**Cascade Charter Township**  
Kent County, Michigan  
**Stormwater Management Plan**







PROJECT NO.  
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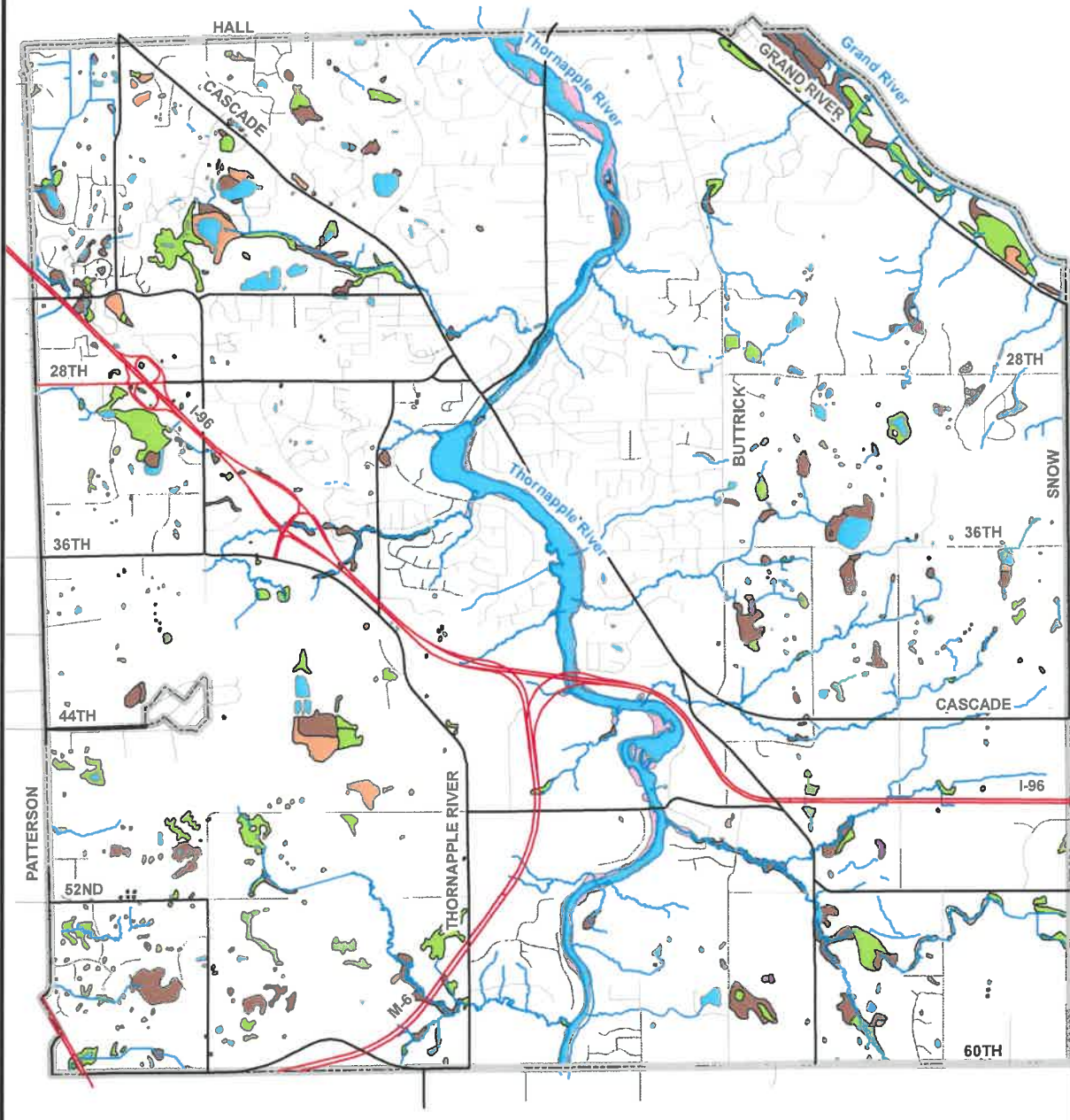
FIGURE NO.

**5**

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**LEGEND**

- |   |   |
|---|---|
|  Aquatic Bed - 0.04% |  Open Water/Unknown Bottom - 10.1% |
|  Emergent - 2.2%     |  Scrub-Shrub - 0.5%                |
|  Forested - 2.4%     |  Unconsolidated Shore - 0.4%       |



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NORTH

**WETLANDS**



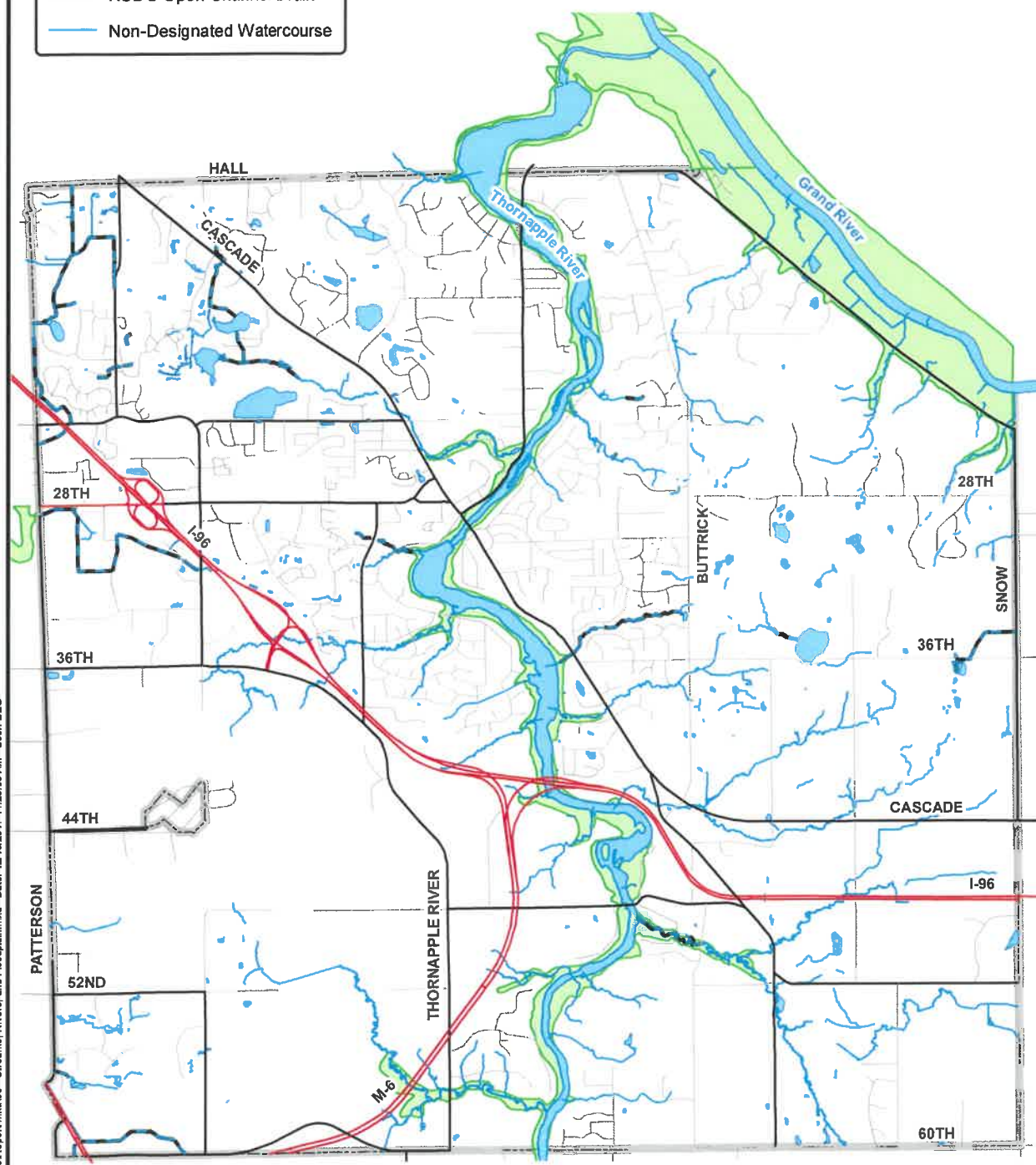




**Cascade Charter Township**  
Kent County, Michigan  
**Stormwater Management Plan**

**LEGEND**

- 100 - Year Floodplain
- River
- KCDC Open Channel Drain
- Non-Designated Watercourse



US Department of Homeland Security FEMA Flood Zones.  
REGIS Agency of the Grand Valley Metropolitan Council.  
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NORTH

**STREAMS, RIVERS,  
AND FLOODPLAIN**









PROJECT NO.  
G130708SAW

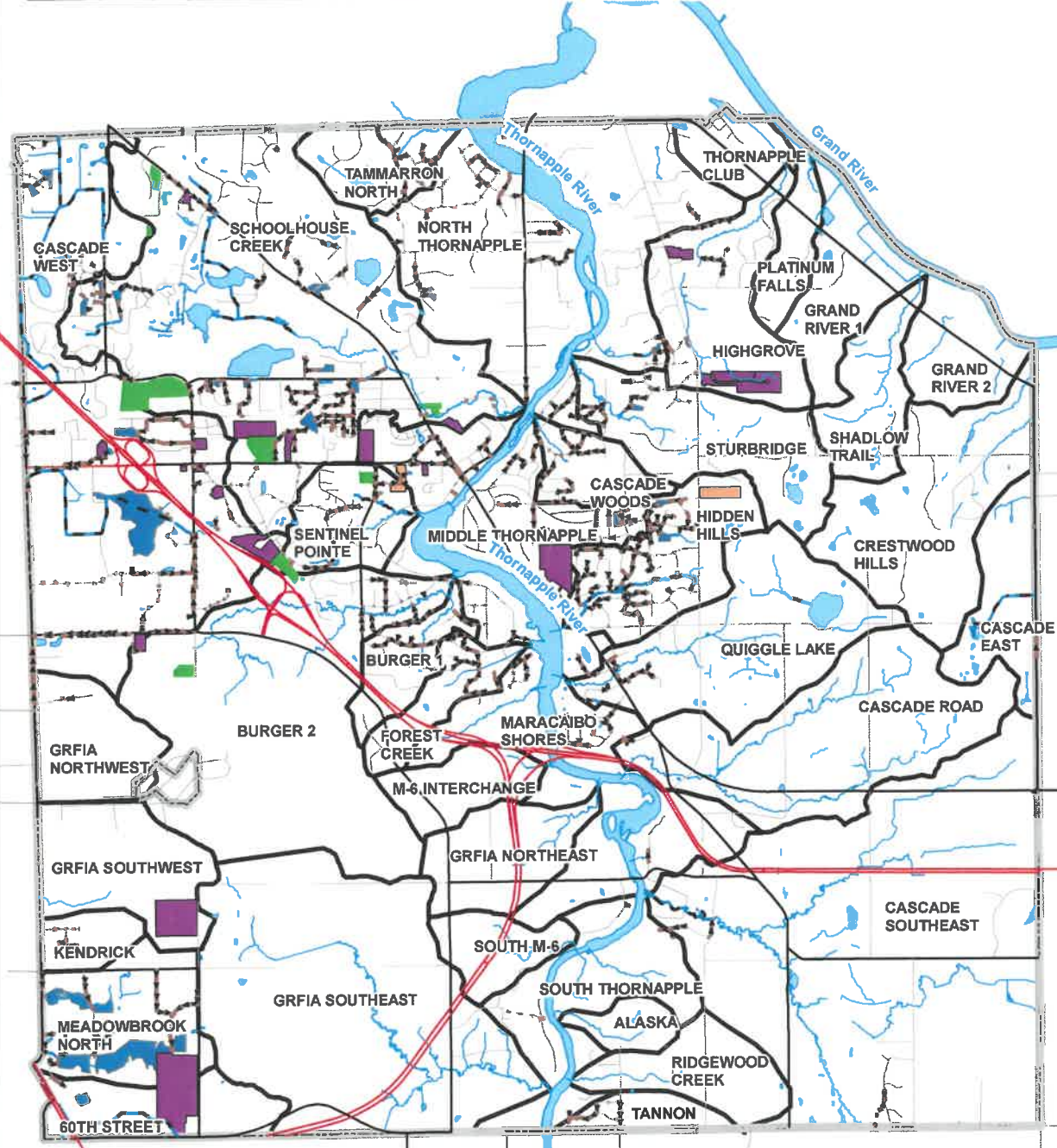
FIGURE NO.  
**8**  
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PLOT INFO: Z:\2013\130708SAW\CAD\GIS\MapDoc\Report.mxd08 - Streams, Rivers, and Floodplain.mxd Date: 12/13/2017 11:26:06 AM User: DEG

**Cascade Charter Township**  
Kent County, Michigan  
**Stormwater Management Plan**

**LEGEND**

-  KCDC Open Channel Drain
-  Storm Sewers
-  Private Detention
-  Private Retention
-  Twp Detention
-  KCDC Detention



**EXISTING  
STORMWATER  
SYSTEM**



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PROJECT NO.  
G130708SAW

FIGURE NO.  
**9**  
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PLOT INFO: Z:\2013\130708SAW\CAD\GIS\MapDoc\Report.mxd09 - Existing Stormwater System.mxd Date: 11/4/2018 9:40:07 AM User: DEG

**Cascade Charter Township**  
Kent County, Michigan  
**Stormwater Management Plan**

PROJECT NO.  
G130708SAW

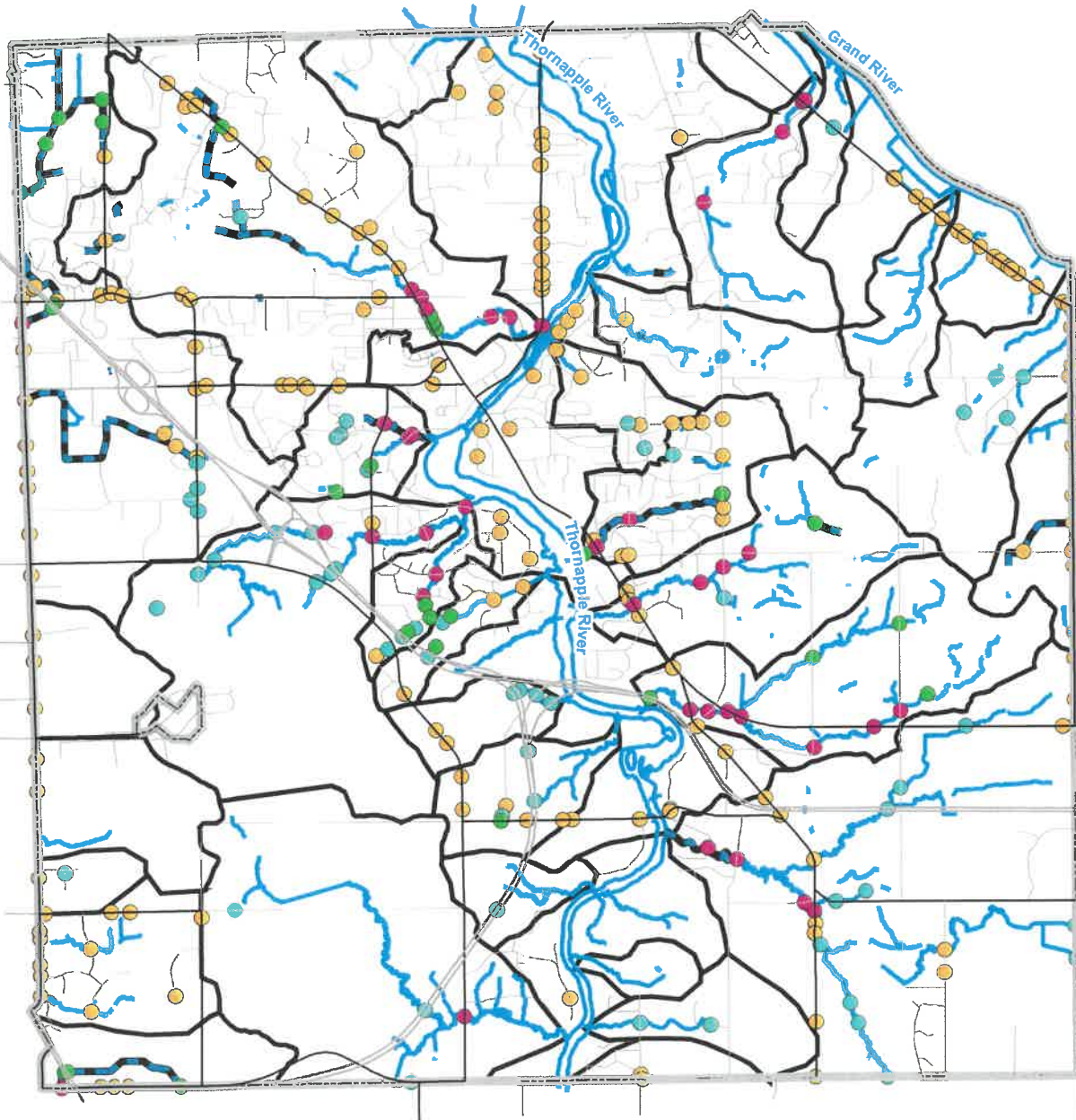
FIGURE NO.

**10**

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**LEGEND**

- 2007 Surveyed Culverts
- 2007 Visually Inspected Culverts
- REGIS
- Added by FTCH (2007) through use of aerial photography



PLOT INFO: Z:\2013\130708SAW\CAD\GIS\MapDoc\Report.mxd10 - Culverts.mxd Date: 9/27/2018 4:45:41 PM User: DEG



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NORTH

**CULVERTS**



FEET

# Appendix 1



# Site Photolog

Cascade Charter Township  
Stormwater Management Plan—Typical Impairments Observed  
Project No: 130708



Ravine erosion, GRFIA District

Ravine bank slump, GRFIA District





## Site Photolog

Cascade Charter Township  
Stormwater Management Plan—Typical Impairments Observed  
Project No: 130708



Storm outfall causing erosion in steep ravine —Tammarron District



Ravine erosion downstream of storm outfall—Tammarron District



## Site Photolog

Cascade Charter Township  
Stormwater Management Plan—Typical Impairments Observed  
Project No: 130708



**Eroding outfall; Quiggle Lake District**



**Obstructions; Quiggle Lake District**



## Site Photolog

Cascade Charter Township  
Stormwater Management Plan—Typical Impairments Observed  
Project No: 130708



**Channel headcut; erosion; poor floodplain connectivity; Hidden Hills District**



**Unstable pattern; downcutting; poor floodplain connectivity; Burger 1 District**



## Site Photolog

Cascade Charter Township  
Stormwater Management Plan—Typical Impairments Observed  
Project No: 130708



Perched culvert—Cascade Woods District



Dislodged storm pipes; erosion; sedimentation—Forest Creek District

# Appendix 2

## CASCADE CHARTER TOWNSHIP STREAM MONITORING PROTOCOL

Pursuant to the 2018 Cascade Charter Township Stormwater Management Plan, biennial monitoring of drainage districts shall be conducted to evaluate changes in stream stability, including but not limited to stream bank erosion, obstructions, altered channel pattern, and threats to buildings and infrastructure. (Detailed measurements, including bankfull width, depth, entrenchment ratio and morphologic features will not be collected during the assessment, unless otherwise specified). The Township will determine priority districts for monitoring based on known impairments and resident concerns. Three to five specific monitoring sites have been established for select watercourses in each of the 8 districts, and are shown on the attached figures. Monitoring shall be conducted according to the protocol below:

### **Monitoring Period**

Monitoring shall be conducted during the growing season, May - October.

### **Stream Inspection Form**

Stream characteristics shall be evaluated and ranked using the Cascade Township Stream Inspection form (attached). Characteristics shall be numerically ranked (1-5) and totaled for each monitoring site/reach.

### **Monitoring Area**

Field verification shall be conducted approximately 300 feet upstream and downstream of established monitoring sites. Monitoring area and reach can be adjusted based upon site conditions observed (ie: significant impairment may require looking further upstream and/or downstream).

### **Field Data Collection**

A GPS Point shall be taken during the first-year monitoring at each monitoring site and/or where data is collected or photographs taken. Field observations and photographs shall be taken from the monumented GPS points during subsequent years.

### **Photographs**

Typical impairments and site conditions shall be documented from monumented (GPS) locations.

### **Summary Report**

Summary report of field investigation shall be provided to the Township by December 31 of each year. Report shall include the following:

- Map of monitoring sites/reaches
- Summary of site conditions and changes from previous monitoring inspections
- Site photographs
- Total stream characteristic score for each watercourse in the drainage district. Streams within the drainage district shall then be priority ranked based on stream characteristic total, level of impairment, and threats to buildings and infrastructure.
- Priority ranking for streams within each drainage district and all districts in the Township, based upon individual stream characteristic rating
- Recommendations for corrective measures, timing, and cost estimate

CASCADE TOWNSHIP  
STREAM INSPECTION



Date: \_\_\_\_\_

Drainage District: \_\_\_\_\_

Stream Name: \_\_\_\_\_

Monitoring Site ID: \_\_\_\_\_

Weather: \_\_\_\_\_

Evaluator Name: \_\_\_\_\_

Rank each stream characteristic 1, 3 or 5 based on criteria noted below. Complete form for each GPS monitoring site as shown on Monitoring Location Figure 1.






	#	CHARACTERISTIC	SCORE	PHOTO #	GPS Point	Comments
PHYSICAL	1	Presence of flow/persistent pools (quiet water) (good flow = 5; no flow/stagnate water = 1)				
	2	Evidence of past human alteration (no alteration = 5; excessive alteration = 1)				
	3	Riparian Zone (wide buffer = 5; no buffer = 1)				
	4	Evidence of Nutrient or Chemical Discharge (no discharge = 5; excessive discharges = 1)				
	5	Groundwater Discharge (no discharge = 5; bank seeps = 1)				
	6	Presence of Floodplain (extensive floodplain = 5; no floodplain = 1)				
	7	Floodplain Access (frequent flooding = 5; deeply entrenched = 1)				
	8	Presence of Wetlands (wetlands = 5; no wetlands = 1)				
	9	Channel Sinuosity (natural meanders = 5; no meanders = 1)				
	10	Sediment Load (little to no sediment = 5; extensive deposition = 1)				
		<b>Subtotal Physical</b>				
STABILITY	11	Channel Bed Composition (cobble/stones/gravel = 5; sands/silt/concrete = 1)				
	12	Bank Erosion (no erosion = 5; severe erosion = 1)				
	13	Erosion Threatening Infrastructure, Buildings, etc. (no threat = 5; significant threat = 1)				
	14	Vegetation on Channel Banks (extensive vegetation = 5; little to no vegetation = 1)				
	15	Previous Stabilization Measures (no failures = 5; failures = 1)				
	16	Undercut Trees (no undercutting = 5; extensive undercutting = 1)				
	17	Log Jams and Obstructions (no obstructions = 5; extensive obstructions = 1)				
	18	Mid-channel Bars (no bars = 5; large or numerous bars = 1)				
	19	Presence of Riffle-Pool/Ripple-Pool Complexes (well developed = 5; no riffles/ripples or pools = 1)				
		<b>Subtotal Stability</b>				
HABITAT	20	Woody Debris in Channel (not obstructing flow) (woody debris = 5; no woody debris = 1)				
	21	Presence of Fish (common/abundant = 5; no evidence = 1)				
		<b>Subtotal Habitat</b>				
BIOLOGY	22	Presence of Amphibians (common/abundant = 5; no evidence = 1)				
	23	Presence of Insects (common/abundant = 5; no evidence = 1)				
	24	Presence of Wildlife Use (common/abundant = 5; no evidence = 1)				
		<b>Subtotal Biology</b>				
		<b>Total Score for Stream</b>				
Comments						

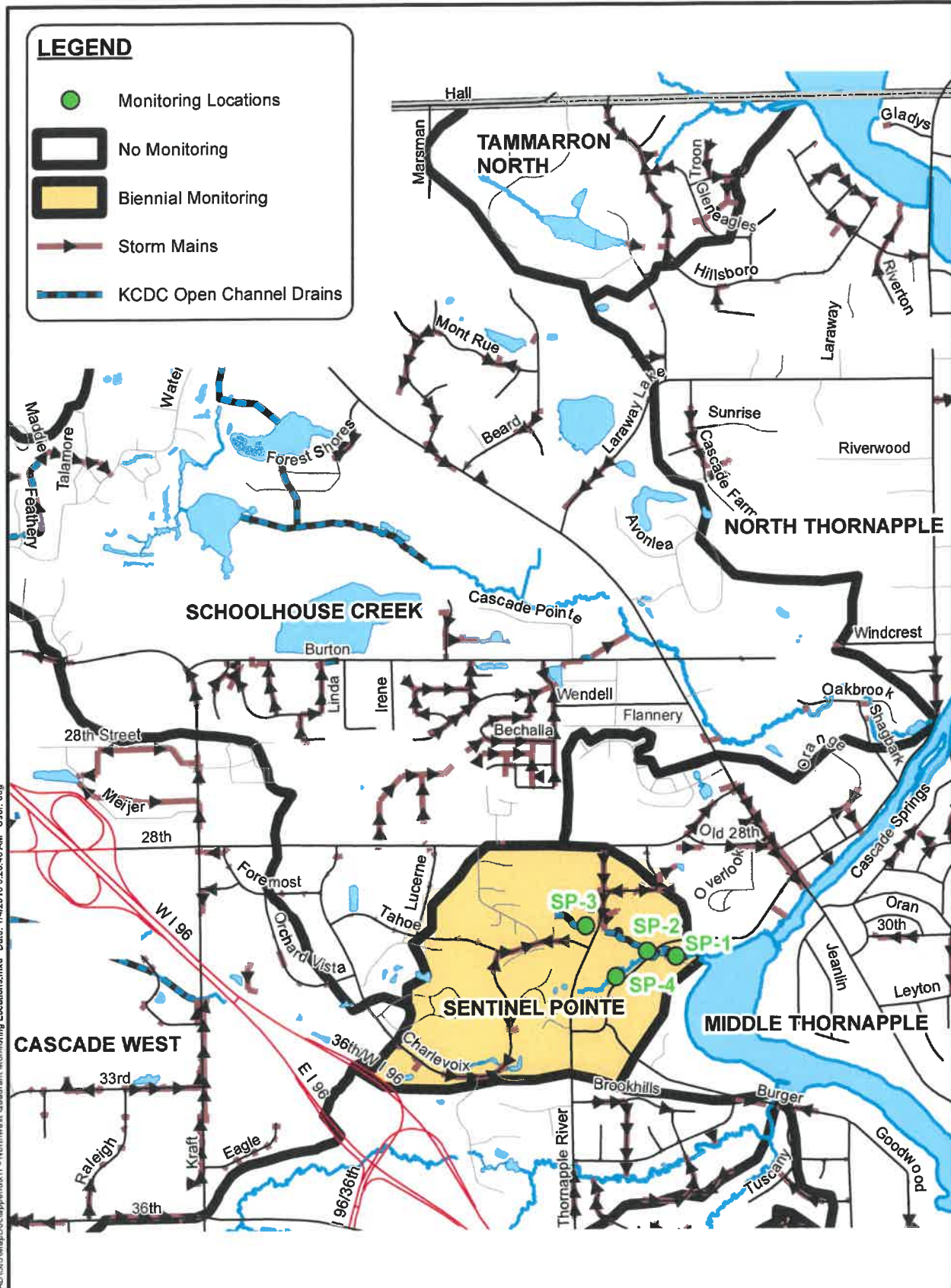
**Cascade Charter Township**  
Kent County, Michigan  
**Stormwater Management Plan**

PROJECT NO.  
G130708SAW

FIGURE NO.  
**1**  
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**LEGEND**

-  Monitoring Locations
-  No Monitoring
-  Biennial Monitoring
-  Storm Mains
-  KCDC Open Channel Drains



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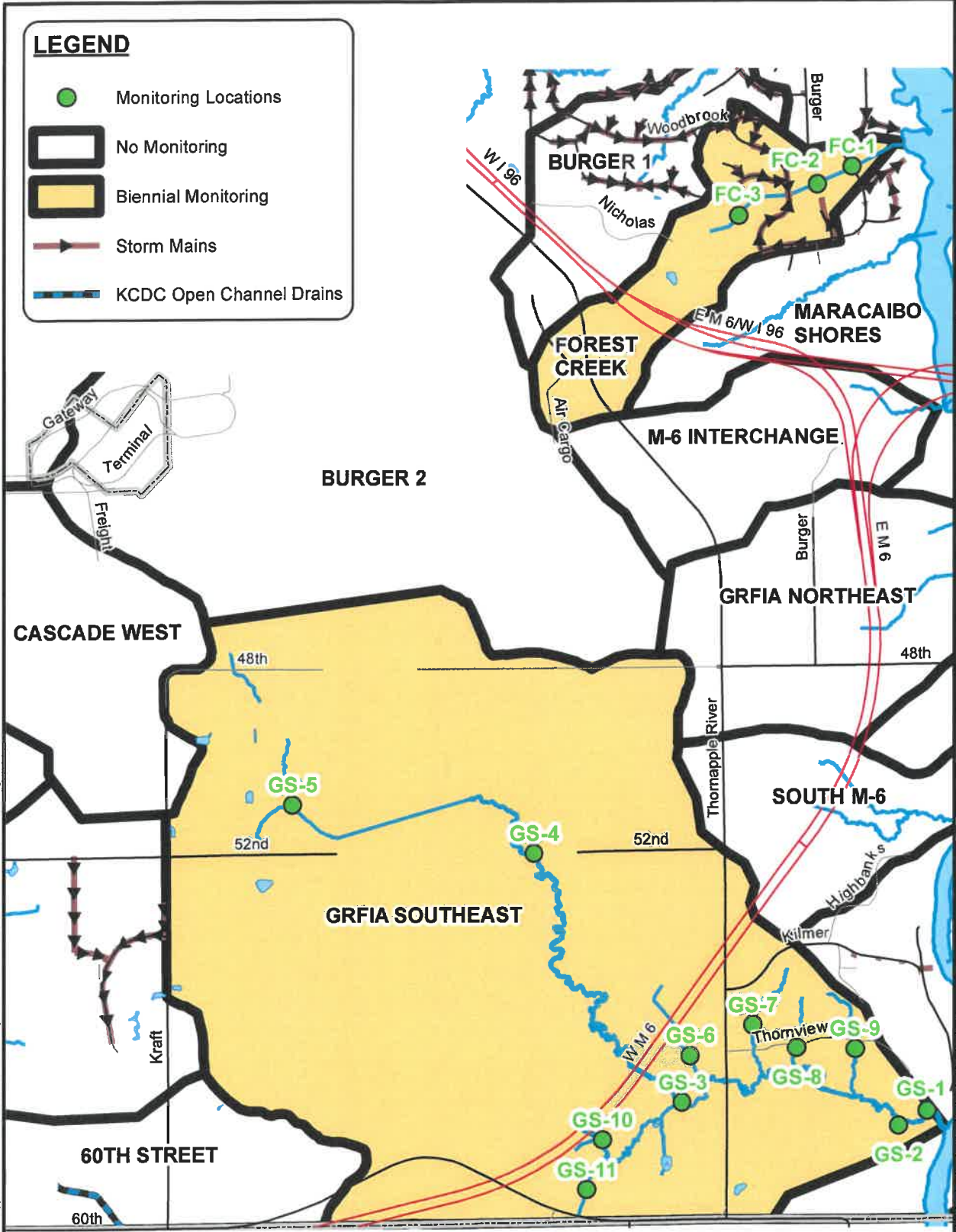
**NORTHWEST QUADRANT  
MONITORING LOCATIONS**



PLOT INFO: Z:\2013\130708S\AWCAD\GIS\MapDoc\appendix1 - Northwest Quadrant Monitoring Locations.mxd Date: 1/4/2018 9:28:45 AM User: deg

**LEGEND**

-  Monitoring Locations
-  No Monitoring
-  Biennial Monitoring
-  Storm Mains
-  KCDC Open Channel Drains



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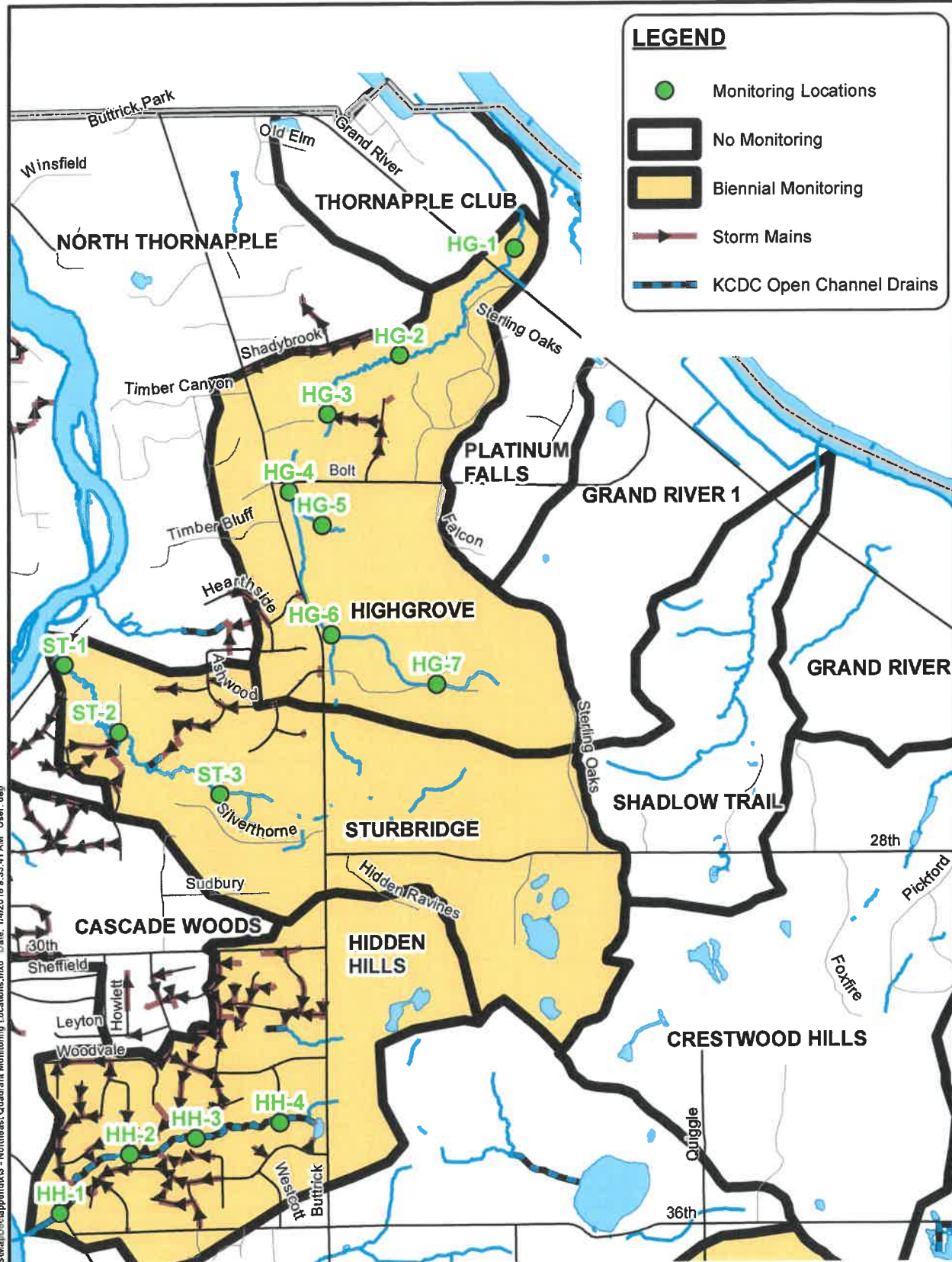
**SOUTHWEST QUADRANT  
MONITORING LOCATIONS**



PLOT INFO: Z:\2013\130708SAW\CAD\GIS\MapDoc\stppendk2 - Southwest Quadrant Monitoring Locations.mxd Date: 1/4/2018 9:33:24 AM User: deg

**LEGEND**

- Monitoring Locations
- No Monitoring
- Biennial Monitoring
- Storm Mains
- KCDC Open Channel Drains



PLOT INFO: Z:\2013\130708SA\AW\CAD\GIS\Map\Doc\Appendix3 - Northeast Quadrant Monitoring Locations.mxd Date: 1/4/2018 8:35:41 AM User: deg



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**NORTHEAST QUADRANT  
MONITORING LOCATIONS**

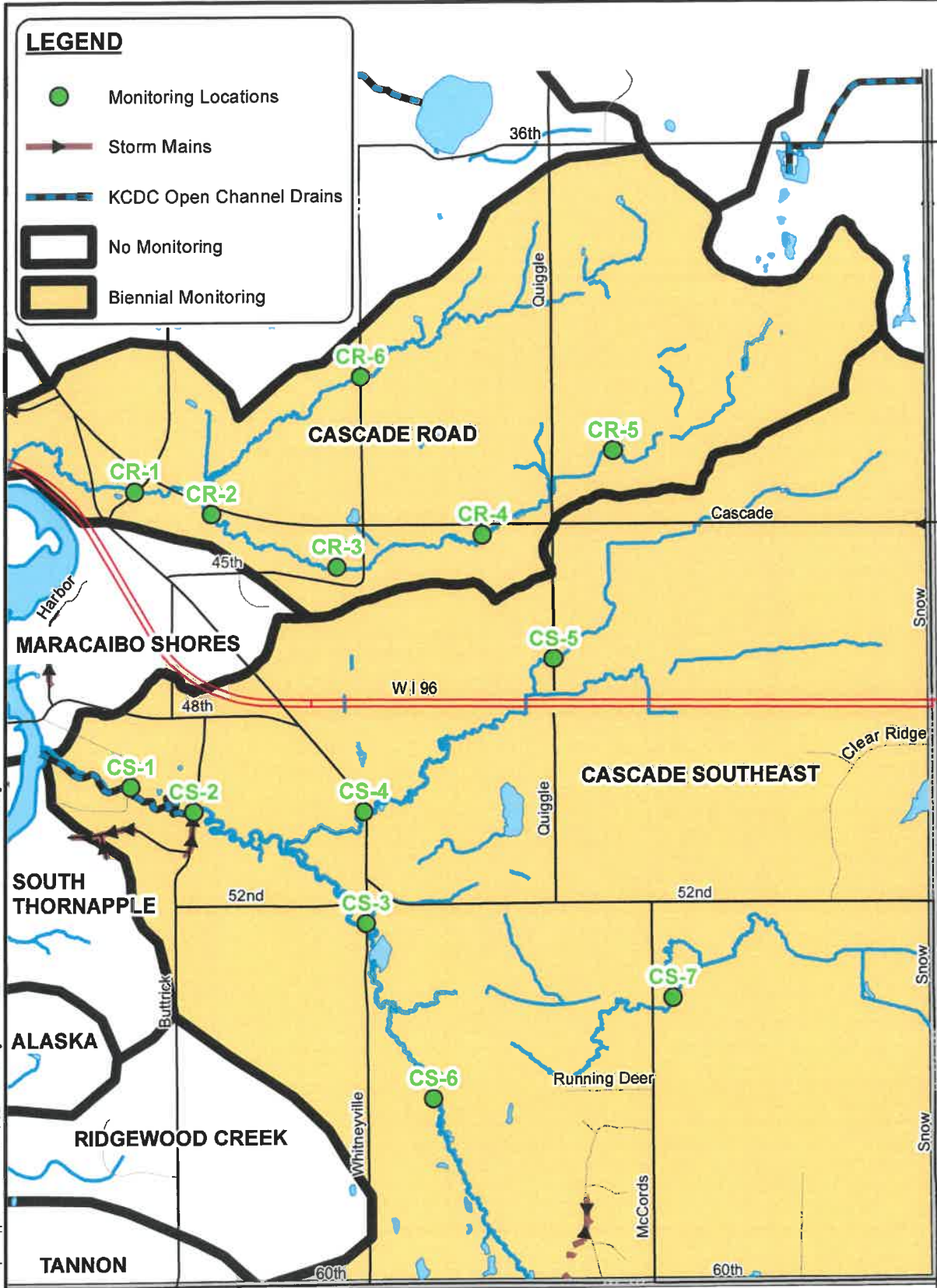


PROJECT NO.  
G130708SAW

FIGURE NO.  
**3**  
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**LEGEND**

-  Monitoring Locations
-  Storm Mains
-  KCDC Open Channel Drains
-  No Monitoring
-  Biennial Monitoring



**fr&h**  
 engineers  
 scientists  
 architects  
 constructors

fishbeck, thompson,  
 carr & huber, inc.

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**Cascade Charter Township**  
 Kent County, Michigan  
**Stormwater Management Plan**

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**SOUTHEAST QUADRANT  
 MONITORING LOCATIONS**



PROJECT NO.  
 G130708SAW

FIGURE NO.  
**4**  
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# Appendix 3



**CONCEPTUAL DESIGN SUMMARY**  
**For**  
**PRIORITY WATERCOURSES BY DISTRICT**

**Schoolhouse Creek District**

Schoolhouse Creek (Schoolhouse) flows through natural areas and backyards, and is in one of the largest drainage districts in the Township. Its watershed is in very close proximity to highly developed areas, including 28<sup>th</sup> Street and Cascade Road, and is almost completely built out. Residents have expressed concern regarding channel instability, erosion, and increased flows in Schoolhouse Creek (Schoolhouse). Sediment load from bank erosion is being deposited into a privately-owned pond just upstream of the Thornapple River. Loss of floodplain connectivity (flood storage) in the upstream areas of the watercourse adversely impact capacity.

*Preliminary* design has been prepared and reviewed by MDEQ, and includes the following: 1,100 lineal feet of floodbench with native seed to improve channel capacity and floodplain connectivity; 3 cross vanes and 12 j-hooks to re-direct flows, protect eroding banks, and improve aquatic habitat.

**Tammarron North District**

Tammarron Hills subdivision is in the northern section of the Township and contains a large, steep ravine which receives private stormwater. Stormwater for the entire subdivision is captured and outlet through a 24" concrete pipe, which discharges into a very steep ravine. In addition, multiple private tiles and a watercourse from neighboring Ada Township contribute flow to the unnamed tributary flowing through the ravine, which discharges into the Thornapple River. The combination of stormwater runoff, sandy soils, high ground water, and steep grade have resulted in significant bank erosion near homes, instability within the ravine, and altered channel morphology.

*Conceptual* design to safeguard the eroding ravine and protect riparian property includes 1,500-6,000 lineal feet of stream bank stabilization, including: 1 plunge pool; step pool complex (300 lineal feet); underdrain (300 lineal feet); 15 riffles; 3 cross vanes, 10 tile outlet stabilizations, and native plantings. Approximately 8,130 lineal feet of road ditches and/or swales is also recommended to reduce peak flows.

**Burger 1 District**

Burger 1 District is comprised of Forest Ridge Estates No. 2, and is located on the western section of the Township. Storm sewers capture 100 percent of residential and road runoff and outlet into an unnamed tributary flowing through a severely degraded and eroding ravine system. The unnamed tributary ultimately outlets into the Thornapple River. Sandy soils, steep banks, and hydrologic changes have resulted in resident's concern for altered channel morphology, streambank erosion and long-term stability of steep, sandy slopes.

*Conceptual* design to safeguard the eroding ravine and protect riparian property includes 1,000-4,000 lineal feet of stream bank stabilization, including: 1 plunge pool; 1,000 lineal feet of channel realignment; 1,000 lineal feet of floodbench; 8 riffles; 6 jhooks, 5 tile outlet stabilizations, and native plantings. Capturing road run off, to



reduce peak flow, is recommended through installation of approximately 13,500 lineal feet of road ditches and swales.

### **Quiggle Lake District**

The unnamed tributary flowing through Quiggle Lake District is approximately 7,100 lineal feet in length and traverses residential and natural areas, including wetlands and wooded corridors, and is a direct tributary to the Thornapple River. Large wetland complexes in the upper reach of the unnamed tributary serve as natural detention areas and no storm pipes directly discharge into the watercourse in this area. However, storm sewer exists in the middle and lower areas and pipes directly discharge into the watercourse. A public detention basin exists upstream of Cascade Road, but services only a very small area of the district. The 36" concrete Cascade Road crossing that was recently replaced is directing flows to adjacent steep and sandy banks. The watercourse is experiencing significant bank erosion, instability and loss of floodplain connectivity. Historic stabilization measures have completely failed resulting in significant channel obstructions. Several outfalls from storm pipes are unstable and causing erosion of steep banks and adjacent areas.

*Conceptual* design to restore channel stability and protect riparian property includes: 1 plunge pool; 1,000 lineal feet of channel realignment; removing obstructions (wood, trash, debris); 10 riffles; 5 cross vanes; 10 j hooks; 800 lineal feet of bar removal, rip rap bank protection, 5 tile outlet stabilizations, and native plantings. Roadside ditches and swales, 6,430 lineal feet, are also recommended to reduce peak flows.

### **Cascade Woods District**

Residents have expressed concern regarding the sediment load associated with the unnamed tributary flowing through the district, which outlets in the Thornapple River. Storm sewers service much of the densely populated neighborhood and discharge into the unnamed tributary. Historic weirs control steep grades in the upper reaches of the watercourse. Significant bank erosion, loss of floodplain connectivity, an unstable channel pattern and a perched 78" CMP at Cascade Springs Road are of concern.

*Conceptual* design to restore channel stability and reduce sediment load includes: 2 plunge pools; 300 lineal feet of channel realignment; 200 lineal of bar removal; 6 riffles; 8 j hooks; 4 tile outlet stabilizations, and rip rap bank protection. Reducing peak flow through installation of approximately 12,900 lineal feet of road side ditches and swales is also recommended.

### **Burger 2 District**

The majority of the upper reach of Burger 2 District is natural/open area directly adjacent to the Gerald R. Ford International Airport, while the lower reach of the district is comprised of residential subdivisions. Similar to other districts, multiple storm sewers and catch basins convey storm water to an unnamed tributary of the Thornapple River. The unnamed tributary also receives water from several other open watercourses in the district. Streambank erosion, unstable channel morphology, and sedimentation are of concern.



*Conceptual* design to restore channel stability and reduce sediment load includes: 2 plunge pools; 300 lineal feet of channel realignment; 200 lineal of bar removal; 6 riffles; 8 j hooks; 4 tile outlet stabilizations, and rip rap bank protection. Reducing peak flow through installation of road side ditches and swales is recommended throughout a 17,500 lineal foot reach.

# Appendix 4

# Citizens Qualitative Stream Assessment (CQSA)



Township Only  
 Drainage District:  
 \_\_\_\_\_

Name: \_\_\_\_\_ Date: \_\_\_\_\_  
 Address: \_\_\_\_\_ Phone: \_\_\_\_\_

CQSA Total  
 \_\_\_\_\_

*Check the box(es) that best describe site conditions for each category.  
 Total and enter category score and total CQSA score.*

I. SUBSTRATE (bottom type)		
<b>a. Size</b> <input type="checkbox"/> 14pt Mostly large (fist size or bigger) <input type="checkbox"/> 10pt Mostly medium (smaller than fist; larger than fingernail) <input type="checkbox"/> 6pt Mostly small (smaller than fingernail; but coarse, or bedrock) <input type="checkbox"/> 0pt Mostly very fine (not coarse; sometimes greasy or mucky)	<b>b. "Smothering"</b> Are fist size & larger pieces smothered by sands/silts? <i>Symptoms: Hard to move pieces, often black on bottom.</i> <input type="checkbox"/> 5pt No <input type="checkbox"/> 0pt Yes	<b>c. "Siltng"</b> Are silts & clays distributed throughout stream? <i>Symptoms: Light kicking/walking results in substantial clouding for more than a minute.</i> <input type="checkbox"/> 5pt No <input type="checkbox"/> 0pt Yes

Score:  
 \_\_\_\_\_

II. EROSION (bank stability & floodplain connectivity)	
<b>a. Erosion</b> <input type="checkbox"/> 4pt No erosion; well vegetated banks <input type="checkbox"/> 2pt Some erosion <input type="checkbox"/> 0pt Extensive erosion; banks collapsing, fracturing or slumping	<b>b. Floodplain connectivity</b> <input type="checkbox"/> 4pt Ground surface; 0.5'-2' above water on both sides <input type="checkbox"/> 2pt Ground surface; 0.5'-2' above water on 1 side <input type="checkbox"/> 0pt Ground surface; >3' above water on both sides

Score:  
 \_\_\_\_\_

III. STREAM SHAPE & HUMAN ALTERATIONS	
<b>a. "Curviness" or "Sinuosity" of Channel</b> <input type="checkbox"/> 8pt 2 or more good bends <input type="checkbox"/> 6pt 1 or 2 good bends <input type="checkbox"/> 3pt Mostly straight; some wiggle <input type="checkbox"/> 0pt Very straight	<b>b. How natural is the site?</b> <input type="checkbox"/> 12pt Mostly natural <input type="checkbox"/> 9pt Few minor man-made changes (e.g., a bridge) <input type="checkbox"/> 6pt Many man-made changes; some natural conditions left (e.g., trees, meanders) <input type="checkbox"/> 0pt Heavy, man-made changes (e.g., bank armor, channelized)

Score:  
 \_\_\_\_\_

IV. STREAM FORESTS & WETLANDS (riparian area)		
<b>a. Riparian Width – Mostly:</b> <input type="checkbox"/> 8pt Wide (can't throw a rock thru it) <input type="checkbox"/> 5pt Narrow (can throw a rock thru it) <input type="checkbox"/> 0pt None	<b>b. Land Use – Mostly:</b> <input type="checkbox"/> 5pt Forest/ Wetland <input type="checkbox"/> 2 pt Conservation tillage <input type="checkbox"/> 4pt Shrubs <input type="checkbox"/> 1pt Residential <input type="checkbox"/> 3pt Overgrown fields <input type="checkbox"/> 0pt Open pasture <input type="checkbox"/> 2pt Fenced pasture <input type="checkbox"/> 0pt Urban/Industrial <input type="checkbox"/> 2pt Park (grass)	<b>c. Stream Shading:</b> <input type="checkbox"/> 3pt Mostly <input type="checkbox"/> 2pt Partly <input type="checkbox"/> 0pt None

Score:  
 \_\_\_\_\_

V. DEPTH & VELOCITY	
<b>a. Deepest pool is at least:</b> <input type="checkbox"/> 8pt Chest deep <input type="checkbox"/> 6pt Waist deep <input type="checkbox"/> 4pt Knee deep <input type="checkbox"/> 0pt Do not exist	<b>b. Check ALL the flow types that you see (add points):</b> <input type="checkbox"/> 2pt Very fast; hard to stand in current <input type="checkbox"/> 3pt Fast; quickly takes object downstream <input type="checkbox"/> 1pt Moderate; slowly takes object downstream <input type="checkbox"/> 1pt Slow; flow nearly absent <input type="checkbox"/> 0pt None

Score:  
 \_\_\_\_\_

VI. RIFFLES/RUNS (areas where current is fast/turbulent; surface may be broken)	
<b>a. Riffles/runs are:</b> <input type="checkbox"/> 8pt Knee deep or deeper & fast <input type="checkbox"/> 6pt Ankle/calf deep & fast <input type="checkbox"/> 4pt Ankle deep or less & slow <input type="checkbox"/> 0pt Do not exist	<b>b. Riffle/run substrates are:</b> <input type="checkbox"/> 7pt Fist size or larger <input type="checkbox"/> 4pt Smaller than fist size, but larger than fingernail <input type="checkbox"/> 0pt Smaller than your fingernails or do not exist

Score:  
 \_\_\_\_\_

VII. Obstructions (fallen trees, log jams, debris)	
<b>a. Trees:</b> <input type="checkbox"/> 4pt Few (<2) fallen trees <input type="checkbox"/> 2pt Some (>3) fallen trees <input type="checkbox"/> 0pt Multiple (>8) fallen trees	<b>b. Obstructions:</b> <input type="checkbox"/> 4pt No obstructions <input type="checkbox"/> 2pt Flow 50% obstructed or diverted (e.g., logs/trees; debris) <input type="checkbox"/> 0pt Flow 100% obstructed (e.g., log jam; debris)

Score:  
 \_\_\_\_\_



# CASCADE CHARTER TOWNSHIP

2865 Thornhills SE Grand Rapids, Michigan 49546-7140

**Date:** November 14, 2018  
**To:** Supervisor Beahan and Township Board Members  
**From:** Ben Swayze, Township Manager  
**Subject:** Hazard Mitigation Plan for Kent and Ottawa Counties

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## **FACTS:**

Cascade Charter Township has been a traditional participant in the Hazard Mitigation Plan for Kent and Ottawa Counties. Local government organizations in the plan, including Cascade, participate in the creation of the plan by reviewing and supplying information about area hazards, concerns and priorities, current prevention measures, and planned mitigation projects.

In order for Cascade to be eligible for future FEMA Hazard Mitigation Funding, the Township must adopt a resolution adopting the most recent plan. This is the second update to the original "Pre-Hazard Mitigation Plan" that was originally approved by FEMA in 2006 and subsequently updated in 2011 and adopted by Cascade Township in 2012

Attached for your review are:

- Proposed Resolution adopting the Hazard Mitigation Plan for Kent and Ottawa Counties
- Hazard Mitigation Plan for Kent and Ottawa Counties (not physically included due to length)
  - [www.accesskent.com/Sheriff/pdfs/GGRHazMitPlan\\_2017.pdf](http://www.accesskent.com/Sheriff/pdfs/GGRHazMitPlan_2017.pdf)

## **ANALYSIS & CONCLUSIONS:**

Adoption of the plan is required for the Township to be considered for future FEMA Hazard Mitigation funding. The Township last received FEMA funding in 2013 to repair bank erosion and repair a retaining wall that was washed out in Tassel Park due to flooding. The plan provides strategies to identify and mitigate potential hazards within the two-county area.

## **FINANCIAL CONSIDERATIONS:**

The approval of the Hazard Mitigation Plan itself has no financial ramifications. By adopting the plan, the Township may be eligible for FEMA Hazard Mitigation Assistance grants in the future.

## **RECOMMENDED ACTION:**

Adopt the resolution adopting the Hazard Mitigation Plan for Kent and Ottawa Counties

**CASCADE CHARTER TOWNSHIP  
KENT COUNTY, MICHIGAN**

**RESOLUTION \_\_\_ of 2018**

**RESOLUTION TO ADOPT THE HAZARD MITIGATION PLAN FOR KENT AND  
OTTAWA COUNTIES**

Minutes of a regular meeting of the Township Board of Cascade Charter Township, County of Kent, State of Michigan, held at the Wisner Center, 2870 Jacksmith Dr. S.E. in said Township on November 14, 2018 at 7:00 o'clock p.m., Eastern Standard Time

PRESENT: Members: \_\_\_\_\_

ABSENT: Members: \_\_\_\_\_

The following preamble and resolution were offered by Board Member \_\_\_\_\_ and supported by Board Member \_\_\_\_\_.

**WHEREAS**, an adopted Hazard Mitigation Plan is required as condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and,

**WHEREAS**, Michigan State Police/Emergency Management Division and Federal Emergency Management Agency Region V officials have reviewed the updated Hazard Mitigation Plan and have approved it contingent upon the official adoption by the included agencies; and,

**WHEREAS,** the Kent County Board of Commissioners have approved the Hazard Mitigation Plan as recommended by the Kent County Sheriff and the Kent County Legislative and Human Resources Committee.

**NOW, THEREFORE, BE IT HEREBY RESOLVED THAT,** the Cascade Charter Township Board approves Hazard Mitigation Plan for Kent and Ottawa Counties

**YEAS:** Board members \_\_\_\_\_

**NAYS:** Board members \_\_\_\_\_

**ABSTAIN:** Board members \_\_\_\_\_

**ABSENT:** Board members \_\_\_\_\_

RESOLUTION DECLARED ADOPTED

\_\_\_\_\_  
Susan B. Slater, Township Clerk

I HEREBY CERTIFY that the foregoing is a true and complete copy of a resolution adopted by the Township Board of Cascade Charter Township, County of Kent, Michigan, at a regular meeting held on November 14, 2018, and that said meeting was conducted and public notice of said meeting was given pursuant to and in full compliance with the Open Meetings Act, being Act 267, Public Acts of Michigan, 1976, and that the minutes of said meeting were kept and will be or have been made available as required by said Act.

Dated: \_\_\_\_\_

\_\_\_\_\_  
Susan B. Slater, Township Clerk