

Appendix A.

State of Michigan *E. coli* Water Quality Standards (WQS)

The designated use rule (R 323.1100 of the Part 4 rules, WQS, promulgated under Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended) states that waters of the state are to be protected for total body contact recreation from May 1 to October 31 and year-round for partial body contact recreation. The target levels for these designated uses are the ambient *E. coli* standards established in Rule 62 of the WQS as follows:

R 323.1062 Microorganisms.

Rule 62. (1) All waters of the state protected for total body contact recreation shall not contain more than 130 E. coli per 100 milliliters, as a 30-day geometric mean. Compliance shall be based on the geometric mean of all individual samples taken during 5 or more sampling events representatively spread over a 30-day period. Each sampling event shall consist of 3 or more samples taken at 2 representative locations within a defined sampling area. At no time shall the waters of the state protected for total body contact recreation contain more than a maximum of 300 E. coli per 100 milliliters. Compliance shall be based on the geometric mean of 3 or more samples taken during the same sampling event at representative locations within a defined sampling area.

Rule 62(2) All surface waters of the state protected for partial body contact recreation shall not contain more than a maximum of 1,000 E. coli per 100 milliliters. Compliance shall be based on the geometric mean of 3 or more samples, taken during the same sampling event, at representative locations within a defined sampling area.

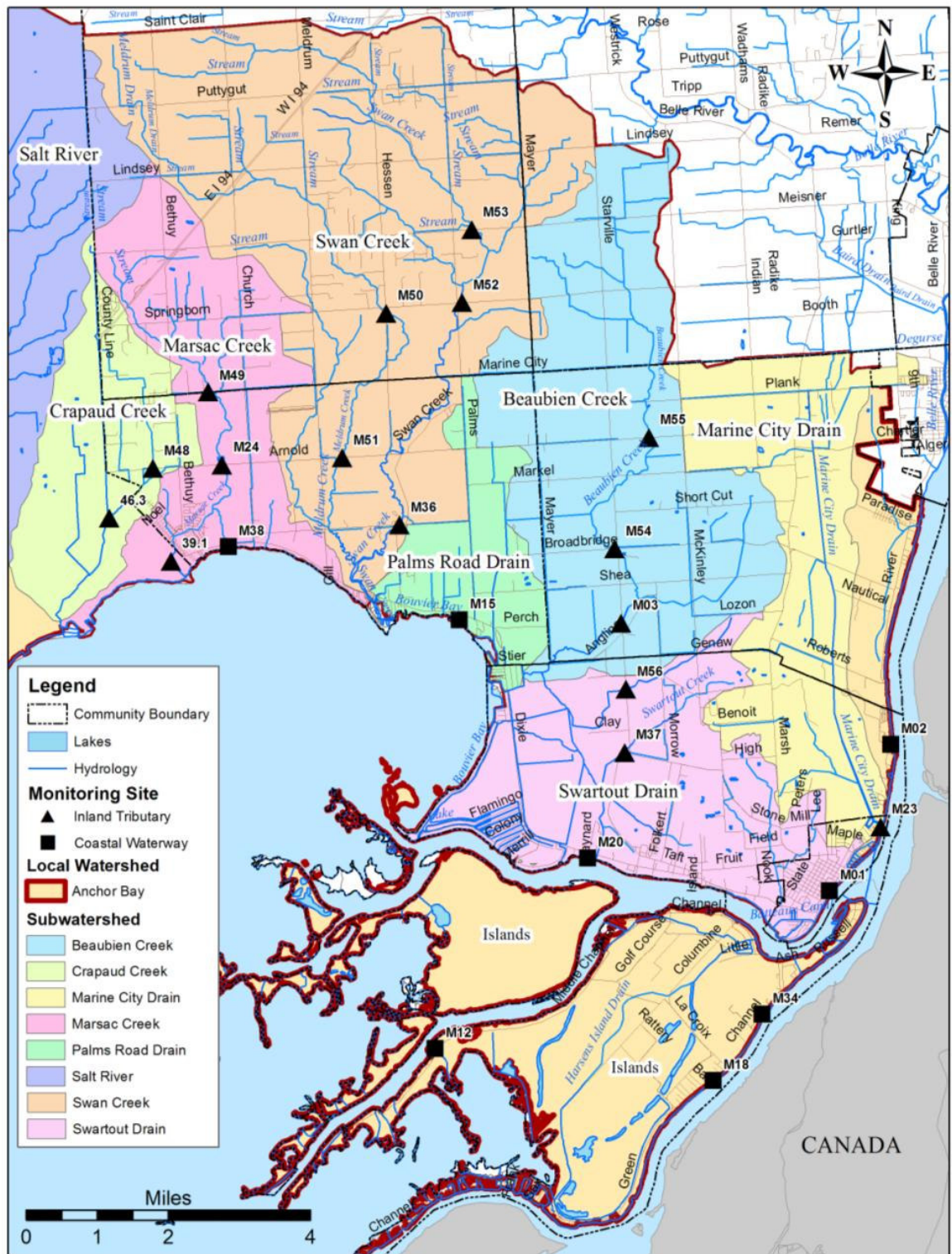
The target for sanitary wastewater discharges is:

Rule 62. (3) Discharges containing treated or untreated human sewage shall not contain more than 200 fecal coliform bacteria per 100 milliliters, based on the geometric mean of all of 5 or more samples taken over a 30-day period, nor more than 400 fecal coliform bacteria per 100 milliliters, based on the geometric mean of all of 3 or more samples taken during any period of discharge not to exceed 7 days. Other indicators of adequate disinfection may be utilized where approved by the department.

Appendix B.

***E. coli* Data and Monitoring Locations**

E. coli Monitoring Locations



St. Clair County Anchor Bay Watershed Shoreline Sampling Results

Date	<i>E. coli</i> (cfu/100 ml)	Weather	Rainfall
Above 300 cfu/100 ml			
M1 - Algonac Boardwalk			
05/12/2008	0	CLEAR	
05/27/2008	2	CLEAR	
06/02/2008	2	CLEAR	
06/09/2008	12	RAINFALL	1.28
06/16/2008	1	RAINFALL	.09
06/23/2008	12	RAINFALL	.97
07/01/2008	8	CLEAR	
07/08/2008	12	CLEAR	
07/14/2008	3	CLEAR	
07/21/2008	1	CLEAR	
07/28/2008	1	CLEAR	
08/04/2008	2	CLEAR	
08/11/2008	7	CLEAR	
08/18/2008	0	CLEAR	
08/25/2008	3	CLEAR	
05/27/2009	14	RAINFALL	.22
06/02/2009	6	DRIZZLE	
06/10/2009	6	OVERCAST	
06/15/2009	3	RAINFALL	.21
06/22/2009	28	CLEAR	
06/29/2009	7	CLEAR	
07/13/2009	1	CLEAR	
07/20/2009	5	NOT DEFINED	
07/28/2009	1	CLEAR	
08/05/2009	2	CLEAR	
08/13/2009	16	CLEAR	
08/17/2009	1	CLEAR	
08/24/2009	1	CLEAR	
08/31/2009	2	NOT DEFINED	
05/19/2010	3	CLEAR	
05/25/2010	6	CLEAR	
06/02/2010	5	RAINFALL	.49
06/10/2010	7	CLEAR	
06/15/2010	1	PARTLY CLOUDY	
06/23/2010	6	OVERCAST	
06/28/2010	5	PARTLY CLOUDY	
06/30/2010	2	PARTLY CLOUDY	
07/07/2010	13	CLEAR	
07/13/2010	7	OVERCAST	

07/21/2010	5	PARTLY CLOUDY
07/27/2010	1	CLEAR
08/03/2010	2	PARTLY CLOUDY
08/10/2010	2	OVERCAST
08/17/2010	8	PARTLY CLOUDY
08/24/2010	2	NOT DEFINED
N=	43	

M2 - Algonac State Park

05/27/2008	12	CLEAR	
06/02/2008	1	CLEAR	
06/09/2008	26	NOT DEFINED	1.28
06/16/2008	2	RAINFALL	.09
06/23/2008	6	RAINFALL	.97
07/01/2008	9	CLEAR	
07/08/2008	13	CLEAR	
07/14/2008	3	CLEAR	
07/21/2008	5	CLEAR	
07/28/2008	11	CLEAR	
08/04/2008	20	CLEAR	
08/11/2008	12	CLEAR	
08/18/2008	2	CLEAR	
08/25/2008	1	CLEAR	
05/27/2009	1	RAINFALL	.22
06/02/2009	4	DRIZZLE	
06/10/2009	28	OVERCAST	
06/15/2009	7	RAINFALL	.21
06/22/2009	57	CLEAR	
06/29/2009	11	CLEAR	
07/06/2009	9	CLEAR	
07/13/2009	2	CLEAR	
07/20/2009	7	NOT DEFINED	
07/28/2009	6	CLEAR	
08/05/2009	5	CLEAR	
08/13/2009	105	CLEAR	
08/17/2009	13	CLEAR	
08/24/2009	5	CLEAR	
08/31/2009	4	NOT DEFINED	
05/19/2010	16	CLEAR	
05/25/2010	5	CLEAR	
06/02/2010	12	RAINFALL	.49
06/10/2010	21	CLEAR	
06/15/2010	26	PARTLY CLOUDY	
06/23/2010	91	OVERCAST	

06/28/2010	34	PARTLY CLOUDY
06/30/2010	10	PARTLY CLOUDY
07/07/2010	2419	CLEAR
07/13/2010	141	OVERCAST
07/21/2010	260	PARTLY CLOUDY
07/27/2010	7	CLEAR
08/03/2010	11	PARTLY CLOUDY
08/10/2010	13	OVERCAST
08/17/2010	140	PARTLY CLOUDY
08/24/2010	11	NOT DEFINED

N= 45

M12 - Browns Landing

CLAY TOWNSHIP

05/15/2008	1	CLEAR	
05/27/2008	0	CLEAR	
06/02/2008	1	CLEAR	
06/09/2008	10	RAINFALL	1.28
06/16/2008	10	RAINFALL	.09
06/23/2008	49	RAINFALL	.97
07/01/2008	17	CLEAR	
07/08/2008	10	CLEAR	
07/14/2008	12	CLEAR	
07/21/2008	70	CLEAR	
07/28/2008	26	CLEAR	
08/04/2008	31	CLEAR	
08/11/2008	26	CLEAR	
08/18/2008	7	CLEAR	
08/25/2008	11	CLEAR	
05/27/2009	5	RAINFALL	.22
06/02/2009	7	DRIZZLE	
06/10/2009	52	OVERCAST	
06/15/2009	25	RAINFALL	.21
06/22/2009	73	CLEAR	
06/29/2009	62	CLEAR	
07/06/2009	17	CLEAR	
07/13/2009	7	CLEAR	
07/20/2009	32	NOT DEFINED	
07/28/2009	61	CLEAR	
08/05/2009	6	CLEAR	
08/13/2009	12	CLEAR	
08/17/2009	10	CLEAR	

08/24/2009	12	CLEAR
08/31/2009	17	NOT DEFINED
05/19/2010	1	CLEAR
05/25/2010	7	CLEAR
06/10/2010	26	CLEAR
06/15/2010	5	PARTLY CLOUDY
06/23/2010	36	DRIZZLE
06/28/2010	12	PARTLY CLOUDY
06/30/2010	6	PARTLY CLOUDY
07/07/2010	4	CLEAR
07/13/2010	11	OVERCAST
07/21/2010	1	PARTLY CLOUDY
07/27/2010	10	CLEAR
08/03/2010	7	OVERCAST
08/10/2010	17	OVERCAST
08/17/2010	4	PARTLY CLOUDY

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M15 - DNR Boat Launch

IRA TOWNSHIP

05/27/2008	4	CLEAR	
06/02/2008	20	CLEAR	
06/09/2008	131	RAINFALL	1.28
06/16/2008	60	NOT DEFINED	
06/23/2008	29	RAINFALL	.97
07/01/2008	21	CLEAR	
07/08/2008	10	CLEAR	
07/14/2008	17	CLEAR	
07/21/2008	7	CLEAR	
07/28/2008	6	CLEAR	
08/04/2008	4	CLEAR	
08/11/2008	0	CLEAR	
08/18/2008	3	CLEAR	
08/25/2008	3	CLEAR	
05/27/2009	69	RAINFALL	.22
06/02/2009	16	DRIZZLE	
06/08/2009	14	OVERCAST	
06/15/2009	7	RAINFALL	.21
06/22/2009	9	CLEAR	
06/29/2009	31	CLEAR	
07/06/2009	2	CLEAR	
07/13/2009	7	CLEAR	
07/20/2009	19	NOT DEFINED	

07/28/2009	9	CLEAR	
08/04/2009	3	CLEAR	
08/13/2009	38	CLEAR	
08/17/2009	4	CLEAR	
08/24/2009	1	CLEAR	
08/31/2009	1	NOT DEFINED	
05/19/2010	6	CLEAR	
05/25/2010	13	CLEAR	
06/02/2010	687	RAINFALL	.49
06/10/2010	34	CLEAR	
06/15/2010	7	PARTLY CLOUDY	
06/23/2010	66	OVERCAST	
06/28/2010	30	PARTLY CLOUDY	
06/30/2010	6	PARTLY CLOUDY	
07/07/2010	5	CLEAR	
07/13/2010	10	OVERCAST	
07/21/2010	33	PARTLY CLOUDY	
07/27/2010	7	CLEAR	
08/03/2010	23	OVERCAST	
08/10/2010	8	OVERCAST	
08/17/2010	22	PARTLY CLOUDY	
08/24/2010	8	NOT DEFINED	

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M18 - Frank Schoonovers Dock

CLAY TOWNSHIP

05/15/2008	1	CLEAR	
05/27/2008	1	CLEAR	
06/02/2008	1	CLEAR	
06/09/2008	5	RAINFALL	1.28
06/16/2008	2	RAINFALL	.09
06/23/2008	20	RAINFALL	.97
07/01/2008	1	CLEAR	
07/08/2008	2	CLEAR	
07/14/2008	2	CLEAR	
07/21/2008	1	CLEAR	
07/28/2008	1	CLEAR	
08/04/2008	1	CLEAR	
08/11/2008	9	CLEAR	
08/18/2008	1	CLEAR	
08/25/2008	2	CLEAR	
05/27/2009	5	RAINFALL	.22
06/02/2009	1	DRIZZLE	
06/10/2009	1	OVERCAST	

06/15/2009	1	RAINFALL	.21
06/22/2009	3	CLEAR	
06/29/2009	3	CLEAR	
07/06/2009	1	CLEAR	
07/13/2009	2	CLEAR	
07/20/2009	1	NOT DEFINED	
07/28/2009	7	CLEAR	
08/05/2009	1	CLEAR	
08/13/2009	2	CLEAR	
08/17/2009	2	CLEAR	
08/24/2009	1	CLEAR	
08/31/2009	1	NOT DEFINED	
05/19/2010	1	CLEAR	
05/25/2010	1	CLEAR	
06/10/2010	2	CLEAR	
06/15/2010	2	PARTLY CLOUDY	
06/23/2010	6	DRIZZLE	
06/28/2010	2	PARTLY CLOUDY	
06/30/2010	1	PARTLY CLOUDY	
07/07/2010	5	CLEAR	
07/13/2010	2	OVERCAST	
07/21/2010	5	PARTLY CLOUDY	
07/27/2010	2	CLEAR	
08/03/2010	1	OVERCAST	
08/10/2010	2	OVERCAST	
08/17/2010	3	PARTLY CLOUDY	

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M20 - Johnnie Legas Pier

CLAY TOWNSHIP

05/15/2008	1	CLEAR	
05/27/2008	5	CLEAR	
06/02/2008	12	CLEAR	
06/09/2008	55	RAINFALL	1.28
06/16/2008	1	RAINFALL	.09
06/23/2008	5	RAINFALL	.97
07/01/2008	9	CLEAR	
07/08/2008	17	CLEAR	
07/14/2008	7	CLEAR	
07/21/2008	23	CLEAR	
07/28/2008	10	CLEAR	
08/04/2008	6	CLEAR	
08/11/2008	2	CLEAR	
08/18/2008	6	CLEAR	

08/25/2008	7	CLEAR	
05/27/2009	3	RAINFALL	.22
06/02/2009	1	DRIZZLE	
06/10/2009	2	OVERCAST	
06/15/2009	2	RAINFALL	.21
06/22/2009	40	CLEAR	
06/29/2009	40	CLEAR	
07/06/2009	24	CLEAR	
07/13/2009	3	CLEAR	
07/20/2009	7	NOT DEFINED	
07/28/2009	44	CLEAR	
08/05/2009	1	CLEAR	
08/13/2009	14	CLEAR	
08/17/2009	10	CLEAR	
08/24/2009	14	CLEAR	
08/31/2009	3	NOT DEFINED	
05/19/2010	5	CLEAR	
05/25/2010	1	CLEAR	
06/02/2010	1	RAINFALL	.49
06/10/2010	1	CLEAR	
06/15/2010	1	PARTLY CLOUDY	
06/23/2010	138	DRIZZLE	
06/28/2010	41	PARTLY CLOUDY	
06/30/2010	17	PARTLY CLOUDY	
07/07/2010	1	CLEAR	
07/13/2010	15	OVERCAST	
07/21/2010	2	PARTLY CLOUDY	
07/27/2010	1	CLEAR	
08/03/2010	4	OVERCAST	
08/10/2010	6	OVERCAST	
08/17/2010	2	PARTLY CLOUDY	
08/24/2010	6	NOT DEFINED	

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M34 - South of 1825 South Channel Drive

CLAY TOWNSHIP

05/15/2008	2	CLEAR	
05/27/2008	4	CLEAR	
06/02/2008	16	CLEAR	
06/09/2008	24	RAINFALL	1.28
06/16/2008	4	RAINFALL	.09
06/23/2008	18	RAINFALL	.97
07/01/2008	7	CLEAR	
07/08/2008	29	CLEAR	

07/14/2008	11	CLEAR	
07/21/2008	11	CLEAR	
07/28/2008	3	CLEAR	
08/04/2008	6	CLEAR	
08/11/2008	8	CLEAR	
08/18/2008	2	CLEAR	
08/25/2008	4	CLEAR	
05/27/2009	10	RAINFALL	.22
06/02/2009	13	DRIZZLE	
06/10/2009	9	OVERCAST	
06/15/2009	1	RAINFALL	.21
06/22/2009	13	CLEAR	
06/29/2009	50	CLEAR	
07/06/2009	7	CLEAR	
07/13/2009	20	CLEAR	
07/20/2009	4	NOT DEFINED	
07/28/2009	15	CLEAR	
08/05/2009	3	CLEAR	
08/13/2009	3	CLEAR	
08/17/2009	12	CLEAR	
08/24/2009	4	CLEAR	
08/31/2009	4	NOT DEFINED	
05/19/2010	4	CLEAR	
05/25/2010	1	CLEAR	
06/10/2010	56	CLEAR	
06/15/2010	5	PARTLY CLOUDY	
06/23/2010	17	DRIZZLE	
06/28/2010	11	PARTLY CLOUDY	
06/30/2010	1	PARTLY CLOUDY	
07/07/2010	4	CLEAR	
07/13/2010	24	OVERCAST	
07/21/2010	5	PARTLY CLOUDY	
07/27/2010	9	NOT DEFINED	
08/03/2010	5	OVERCAST	
08/10/2010	5	OVERCAST	
08/17/2010	2	PARTLY CLOUDY	

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M38 - Tin Fish

IRA TOWNSHIP

05/15/2008	10	CLEAR
05/27/2008	23	CLEAR
06/02/2008	7	CLEAR

06/09/2008	73	RAINFALL	1.28
06/16/2008	13	RAINFALL	.09
06/23/2008	68	RAINFALL	.97
07/01/2008	16	CLEAR	
07/08/2008	81	CLEAR	
07/14/2008	17	CLEAR	
07/21/2008	17	CLEAR	
07/28/2008	12	CLEAR	
08/04/2008	35	CLEAR	
08/11/2008	19	CLEAR	
08/18/2008	21	CLEAR	
08/25/2008	25	CLEAR	
05/27/2009	1	RAINFALL	.22
06/02/2009	38	DRIZZLE	
06/08/2009	1	OVERCAST	
06/15/2009	7	RAINFALL	.21
06/22/2009	7	CLEAR	
06/29/2009	24	CLEAR	
07/06/2009	6	CLEAR	
07/13/2009	9	CLEAR	
07/20/2009	5	NOT DEFINED	
07/28/2009	6	CLEAR	
08/04/2009	29	CLEAR	
08/13/2009	20	CLEAR	
08/17/2009	93	CLEAR	
08/24/2009	9	CLEAR	
08/31/2009	3	NOT DEFINED	
05/19/2010	1	CLEAR	
05/25/2010	1	CLEAR	
06/02/2010	36	RAINFALL	.49
06/10/2010	26	CLEAR	
06/15/2010	19	PARTLY CLOUDY	
06/23/2010	166	OVERCAST	
06/28/2010	19	PARTLY CLOUDY	
06/30/2010	28	PARTLY CLOUDY	
07/07/2010	167	CLEAR	
07/13/2010	238	OVERCAST	
07/21/2010	60	PARTLY CLOUDY	
07/27/2010	40	CLEAR	
08/03/2010	249	OVERCAST	
08/10/2010	1986	OVERCAST	
08/17/2010	291	PARTLY CLOUDY	
08/24/2010	16	NOT DEFINED	

St. Clair County Anchor Bay Tributary Sampling Results for Routinely Monitored Sites

Date	<i>E. coli</i> (cfu/100 ml)	Weather	Rainfall
Above 300 cfu/100 ml			
M36 - Swan Creek at Shortcut Rd			
IRA TOWNSHIP			
Swan Creek			
05/15/2008	411	CLEAR	
05/27/2008	272	CLEAR	
06/02/2008	194	CLEAR	
06/09/2008	461	RAINFALL	1.28
06/16/2008	345	RAINFALL	.09
06/23/2008	248	RAINFALL	.97
07/01/2008	435	CLEAR	
07/08/2008	365	CLEAR	
07/14/2008	548	CLEAR	
07/21/2008	866	CLEAR	
07/28/2008	214	CLEAR	
08/04/2008	68	CLEAR	
08/11/2008	49	CLEAR	
08/18/2008	142	CLEAR	
08/25/2008	0	CLEAR	
05/27/2009	18	RAINFALL	.22
06/02/2009	99	DRIZZLE	
06/08/2009	150	OVERCAST	
06/15/2009	161	RAINFALL	.21
06/22/2009	770	CLEAR	
06/29/2009	61	CLEAR	
07/06/2009	12	CLEAR	
07/13/2009	55	CLEAR	
07/20/2009	13	NOT DEFINED	
07/28/2009	12	CLEAR	
08/04/2009	62	CLEAR	
08/13/2009	488	CLEAR	
08/17/2009	141	CLEAR	
08/24/2009	162	CLEAR	
08/31/2009	649	NOT DEFINED	
05/19/2010	144	CLEAR	
05/25/2010	727	CLEAR	
06/02/2010	155	RAINFALL	.49
06/10/2010	345	CLEAR	
06/15/2010	238	PARTLY CLOUDY	
06/23/2010	138	OVERCAST	

Date	<i>E. coli</i> (cfu/100 ml)	Weather	Rainfall
Above 300 cfu/100 ml			
06/28/2010	128	PARTLY CLOUDY	
06/30/2010	66	PARTLY CLOUDY	
07/07/2010	39	CLEAR	
07/13/2010	43	OVERCAST	
07/21/2010	176	PARTLY CLOUDY	
07/27/2010	167	CLEAR	
08/03/2010	161	OVERCAST	
08/10/2010	172	OVERCAST	
08/17/2010	80	PARTLY CLOUDY	
08/24/2010	59	NOT DEFINED	
M37 - Swartout Creek at Phelps Rd.			
CLAY TOWNSHIP			
05/15/2008	74	CLEAR	
05/27/2008	80	CLEAR	
06/02/2008	196	CLEAR	
06/09/2008	488	RAINFALL	1.28
06/16/2008	579	RAINFALL	.09
06/23/2008	345	RAINFALL	.97
07/01/2008	435	CLEAR	
07/08/2008	387	CLEAR	
07/14/2008	345	CLEAR	
07/21/2008	276	CLEAR	
07/28/2008	1986	CLEAR	
08/04/2008	272	CLEAR	
08/11/2008	189	CLEAR	
08/18/2008	13	CLEAR	
08/25/2008	108	CLEAR	
05/27/2009	130	RAINFALL	.22
06/02/2009	248	DRIZZLE	
06/10/2009	236	OVERCAST	
06/15/2009	249	RAINFALL	.21
06/22/2009	236	CLEAR	
06/29/2009	161	CLEAR	
07/06/2009	261	CLEAR	
07/13/2009	308	CLEAR	
07/20/2009	488	NOT DEFINED	
07/28/2009	248	CLEAR	
08/04/2009	1414	CLEAR	
08/13/2009	435	CLEAR	
08/17/2009	579	CLEAR	

Date	<i>E. coli</i> (cfu/100 ml)	Weather	Rainfall
Above 300 cfu/100 ml			
08/24/2009	980	CLEAR	
08/31/2009	980	NOT DEFINED	
05/19/2010	162	CLEAR	
05/25/2010	299	CLEAR	
06/02/2010	1553	RAINFALL	.49
06/10/2010	261	CLEAR	
06/15/2010	649	PARTLY CLOUDY	
06/23/2010	1414	DRIZZLE	
06/28/2010	308	PARTLY CLOUDY	
06/30/2010	613	PARTLY CLOUDY	
07/07/2010	365	CLEAR	
07/13/2010	435	OVERCAST	
07/21/2010	1203	PARTLY CLOUDY	
07/27/2010	2419	CLEAR	
M23 - Marine City Dredge Cut			
MARINE CITY			
05/15/2008	411	CLEAR	
05/27/2008	148	CLEAR	
06/02/2008	127	CLEAR	
06/09/2008	152	RAINFALL	1.28
06/16/2008	185	RAINFALL	.09
06/23/2008	196	RAINFALL	.97
07/01/2008	21	CLEAR	
07/08/2008	214	CLEAR	
07/14/2008	387	CLEAR	
07/21/2008	225	CLEAR	
07/28/2008	39	CLEAR	
08/04/2008	19	CLEAR	
08/11/2008	687	CLEAR	
08/18/2008	78	CLEAR	
08/25/2008	115	CLEAR	
05/27/2009	91	RAINFALL	.22
06/02/2009	179	DRIZZLE	
06/10/2009	19	OVERCAST	
06/15/2009	126	RAINFALL	.21
06/22/2009	74	CLEAR	
06/29/2009	225	CLEAR	
07/06/2009	86	CLEAR	
07/20/2009	61	NOT DEFINED	
07/28/2009	75	CLEAR	

Date	<i>E. coli</i> (cfu/100 ml)	Weather	Rainfall
Above 300 cfu/100 ml			
08/05/2009	16	CLEAR	
08/13/2009	199	CLEAR	
08/17/2009	56	CLEAR	
08/24/2009	49	CLEAR	
08/31/2009	17	NOT DEFINED	
05/19/2010	71	CLEAR	
05/25/2010	155	CLEAR	
06/02/2010	107	RAINFALL	.49
06/10/2010	345	CLEAR	
06/15/2010	214	PARTLY CLOUDY	
06/23/2010	411	OVERCAST	
06/28/2010	308	NOT DEFINED	
06/30/2010	108	PARTLY CLOUDY	
07/07/2010	23	CLEAR	
07/13/2010	261	OVERCAST	
07/21/2010	65	NOT DEFINED	
07/27/2010	40	CLEAR	
08/03/2010	37	PARTLY CLOUDY	
08/10/2010	133	OVERCAST	
08/17/2010	108	PARTLY CLOUDY	
08/24/2010	131	NOT DEFINED	
M24 - Marsac Creek at Arnold Rd.			
IRA TOWNSHIP			
05/15/2008	548	CLEAR	
05/27/2008	98	CLEAR	
06/02/2008	150	CLEAR	
06/09/2008	201	RAINFALL	1.28
06/16/2008	228	RAINFALL	.09
06/23/2008	1733	RAINFALL	.97
07/01/2008	365	CLEAR	
07/08/2008	579	CLEAR	
07/14/2008	1553	CLEAR	
07/21/2008	1203	CLEAR	
07/28/2008	141	CLEAR	
08/04/2008	613	CLEAR	
08/11/2008	2419	CLEAR	
08/18/2008	101	CLEAR	
08/25/2008	488	CLEAR	
05/27/2009	40	RAINFALL	.22
06/02/2009	196	DRIZZLE	

Date	<i>E. coli</i> (cfu/100 ml)	Weather	Rainfall
Above 300 cfu/100 ml			
06/08/2009	236	OVERCAST	
06/15/2009	727	RAINFALL	.21
06/22/2009	517	CLEAR	
06/29/2009	1203	CLEAR	
07/06/2009	649	CLEAR	
07/13/2009	276	CLEAR	
07/20/2009	291	NOT DEFINED	
07/28/2009	172	CLEAR	
08/04/2009	260	CLEAR	
08/13/2009	2419	CLEAR	
08/17/2009	2419	CLEAR	
08/24/2009	980	CLEAR	
08/31/2009	980	NOT DEFINED	
05/19/2010	236	CLEAR	
05/25/2010	186	CLEAR	
06/02/2010	1120	RAINFALL	.49
06/10/2010	2419	CLEAR	
06/15/2010	548	PARTLY CLOUDY	
06/23/2010	1300	OVERCAST	
06/28/2010	2419	PARTLY CLOUDY	
06/30/2010	248	PARTLY CLOUDY	
07/07/2010	2419	CLEAR	
07/13/2010	980	OVERCAST	
07/21/2010	866	PARTLY CLOUDY	
07/27/2010	548	CLEAR	
08/03/2010	579	OVERCAST	
08/10/2010	727	OVERCAST	
08/17/2010	435	PARTLY CLOUDY	
08/24/2010	205	NOT DEFINED	
M03 - Beaubien Creek at Starville Rd.			
COTTRELLVILLE TWP			
05/15/2008	375	CLEAR	
05/27/2008	0	CLEAR	
06/02/2008	61	CLEAR	
06/09/2008	248	RAINFALL	1.28
06/16/2008	115	RAINFALL	.09
06/23/2008	179	RAINFALL	.97
07/01/2008	461	CLEAR	
07/08/2008	921	CLEAR	
07/14/2008	548	CLEAR	

Date	<i>E. coli</i> (cfu/100 ml)	Weather	Rainfall
Above 300 cfu/100 ml			
07/21/2008	579	CLEAR	
07/28/2008	13	CLEAR	
08/04/2008	172	CLEAR	
08/11/2008	8	CLEAR	
08/18/2008	88	CLEAR	
08/25/2008	31	CLEAR	
05/27/2009	135	RAINFALL	.22
06/02/2009	45	DRIZZLE	
06/08/2009	214	OVERCAST	
06/15/2009	192	RAINFALL	.21
06/22/2009	613	CLEAR	
06/29/2009	1203	CLEAR	
07/06/2009	461	CLEAR	
07/13/2009	1986	CLEAR	
07/20/2009	16	NOT DEFINED	
07/28/2009	101	CLEAR	
08/04/2009	15	CLEAR	
08/13/2009	1986	CLEAR	
08/17/2009	146	CLEAR	
08/24/2009	66	CLEAR	
08/31/2009	36	NOT DEFINED	
05/19/2010	68	CLEAR	
05/25/2010	210	CLEAR	
06/02/2010	1300	RAINFALL	.49
06/10/2010	770	CLEAR	
06/15/2010	411	PARTLY CLOUDY	
06/23/2010	236	OVERCAST	
06/28/2010	1046	PARTLY CLOUDY	
06/30/2010	86	PARTLY CLOUDY	
07/07/2010	132	CLEAR	
07/13/2010	155	OVERCAST	
07/21/2010	365	PARTLY CLOUDY	
07/27/2010	54	CLEAR	
08/03/2010	4	OVERCAST	
08/10/2010	46	OVERCAST	
08/17/2010	10	PARTLY CLOUDY	

Macomb County Anchor Bay Select Routinely Monitored Tributary Sampling Results

Site 46.3 Crapau Creek @ County Line Rd		Site 39.1 Marsac Creek @ M29	
DATE	<i>E. coli</i> (cfu/100 ml)	DATE	<i>E. coli</i> (cfu/100 ml)
Above 300 cfu/100 ml		Above 300 cfu/100 ml	
1/8/08	638	1/8/2008	771
1/15/08	30	1/15/2008	17,329
2/5/08	1,211	2/5/2008	1,169
2/19/08	728	4/1/2008	203
3/4/08	213	4/8/2008	109
3/18/08	20	4/15/2008	131
3/25/08	74	4/22/2008	98
4/1/08	350	4/29/2008	161
4/8/08	31	5/6/2008	41
4/15/08	107	5/13/2008	364
4/22/08	677	5/20/2008	350
4/29/08	2,481	5/27/2008	934
5/6/08	96	6/3/2008	148
5/13/08	563	6/10/2008	57,940
5/20/08	1,201	6/17/2008	190
5/27/08	1,860	6/24/2008	17,329
6/3/08	4,884	7/1/2008	173
6/10/08	17,329	7/8/2008	161
6/17/08	4,106	7/15/2008	86
6/24/08	645	7/18/2008	884
7/1/08	776	7/22/2008	75
7/8/08	960	7/29/2008	74
7/15/08	4,611	8/5/2008	131
7/17/08	7,270	8/12/2008	160
7/22/08	1,314	8/19/2008	85
7/29/08	11,199	8/26/2008	669

Site 46.3 Crapau Creek @ County Line Rd		Site 39.1 Marsac Creek @ M29	
DATE	<i>E. coli</i> (cfu/100 ml)	DATE	<i>E. coli</i> (cfu/100 ml)
Above 300 cfu/100 ml		Above 300 cfu/100 ml	
8/5/08	1,012	9/2/2008	1,631
8/12/08	605	9/9/2008	5,794
8/19/08	1,223	9/16/2008	798
8/26/08	884	9/23/2008	143
9/2/08	631	9/30/2008	4,611
9/9/08	6,867	10/7/2008	135
9/16/08	753	10/14/2008	20
9/23/08	728	10/21/2008	404
9/30/08	6,488	10/28/2008	41
10/7/08	285	11/5/2008	9,804
10/14/08	3,130	11/12/2008	41
10/21/08	97	11/18/2008	419
10/28/08	520	12/2/2008	884
11/5/08	833	12/29/2008	422
11/12/08	269	3/10/2009	495
11/18/08	601	3/17/2009	1,259
11/25/08	683	3/24/2009	4,106
12/2/08	246	3/31/2009	158
12/9/08	109	4/7/2009	160
12/16/08	240	4/14/2009	146
2/10/09	216	4/21/2009	888
3/10/09	73	4/28/2009	6,131
3/17/09	1	5/5/2009	243
3/24/09	52	5/12/2009	419
3/31/09	41	5/19/2009	771
4/7/09	860	5/26/2009	187
4/14/09	132	6/2/2009	382
4/21/09	987	6/9/2009	505

Site 46.3 Crapau Creek @ County Line Rd		Site 39.1 Marsac Creek @ M29	
DATE	<i>E. coli</i> (cfu/100 ml)	DATE	<i>E. coli</i> (cfu/100 ml)
Above 300 cfu/100 ml		Above 300 cfu/100 ml	
4/28/09	8,164	6/16/2009	382
5/5/09	20	6/23/2009	789
5/12/09	74	7/7/2009	98
5/19/09	183	7/14/2009	98
5/26/09	657	7/21/2009	148
6/2/09	1,483	7/28/2009	148
6/9/09	2,723	8/4/2009	52
6/16/09	231	8/11/2009	9,804
6/23/09	3,255	8/18/2009	5,475
7/7/09	5,172	8/25/2009	512
7/14/09	3,255	9/8/2009	27,230
7/21/09	12,997	9/15/2009	379
7/28/09	2,489	9/22/2009	826
8/4/09	1,354	9/29/2009	2,909
8/11/09	909	10/6/2009	115
8/18/09	3,255	10/13/2009	364
8/25/09	1,515	10/20/2009	1,039
9/8/09	15,531	10/27/2009	282
9/15/09	122	11/3/2009	609
9/22/09	10,122	11/9/2009	2,909
9/29/09	1,354	11/17/2009	30
10/6/09	1,414	11/24/2009	50
10/13/09	1,968	12/8/2009	543
10/20/09	548	12/15/2009	6,488
10/27/09	75	3/9/2010	161
11/3/09	188	3/16/2010	201
11/9/09	257	3/23/2010	359
11/17/09	1,076	3/30/2010	5,794

Site 46.3 Crapau Creek @ County Line Rd		Site 39.1 Marsac Creek @ M29	
DATE	<i>E. coli</i> (cfu/100 ml)	DATE	<i>E. coli</i> (cfu/100 ml)
Above 300 cfu/100 ml		Above 300 cfu/100 ml	
11/24/09	74	4/6/2010	19,863
12/8/09	265	4/13/2010	1,059
12/15/09	1,222	4/20/2010	1,935
12/22/09	369	4/27/2010	816
1/26/10	292	5/4/2010	332
3/2/10	75	5/11/2010	6,867
3/9/10	242	5/18/2010	3,448
3/16/10	10	5/25/2010	63
3/23/10	10	6/8/2010	1,106
3/30/10	10	6/15/2010	474
4/6/10	19,863	6/22/2010	1,043
4/13/10	108	6/29/2010	206
4/20/10	10	7/6/2010	20
4/27/10	247	7/13/2010	1,124
5/4/10	1,153	7/20/2010	573
5/11/10	6,867	7/27/2010	259
5/18/10	2,063	8/3/2010	30
5/25/10	3,130	8/10/2010	20
6/8/10	1,779	8/17/2010	20
6/15/10	4,611	8/24/2010	52
6/22/10	7,701	8/31/2010	10
6/29/10	3,441	9/7/2010	203
7/6/10	122	9/14/2010	74
7/13/10	1,246	9/21/2010	31
7/20/10	4,611	9/28/2010	17,329
7/27/10	311	10/5/2010	63
8/3/10	52	10/12/2010	142
8/10/10	328	10/19/2010	10

Site 46.3 Crapau Creek @ County Line Rd		Site 39.1 Marsac Creek @ M29	
DATE	<i>E. coli</i> (cfu/100 ml)	DATE	<i>E. coli</i> (cfu/100 ml)
Above 300 cfu/100 ml		Above 300 cfu/100 ml	
8/17/10	171	10/26/2010	190
8/24/10	1,725	11/9/2010	31
8/31/10	201	11/16/2010	86
9/7/10	86	11/24/2010	404
9/14/10	10	11/30/2010	5,172
9/21/10	598	12/7/2010	86
9/28/10	9,804	12/14/2010	94
10/5/10	556		
10/12/10	9,208		
10/19/10	173		
10/26/10	354		
11/9/10	10		
11/16/10	97		
11/24/10	233		
11/30/10	1,100		

St. Clair County Anchor Bay 2010 Investigative *E. coli* Monitoring Results (cfu/100 ml)

Date	Crapau Creek	Marsac Creek	Swan Creek				Beaubien Creek		Swartout Creek
	M48	M49	M51	M50	M53	M52	M54	M55	M56
	Benoit Drain @ Arnold	@ Marine City Hwy	Meldrum Drain @ Arnold	Meldrum Drain @ Springborn	Casco Drain @ Meisner	Swan Creek @ Springborn	@ Broadbridge	@ Arnold	Beaverdam Drain @ Morrow
6/2/2010									
6/10/2010									
6/15/2010									
6/23/2010	236	1,203	579		154		129		276
6/28/2010									
6/30/2010	67	488	1,120	1,120	201	53	81	88	
7/13/2010	2,419	2,419	2,419	1,203	1,986	1,300	178	50	
7/27/2010	219	649	517	238	326	326	249	114	
8/10/2010		770	2,419	727	160	210	2,419	260	
8/24/2010		649	1,986	1,230	11	78	23	1	

Data above the water quality standard of 300 cfu/100 ml

Vacant cells indicate that the site was visited, but no sample was collected (usually due to lack of flow)

Appendix C.
Regulated Storm Water Outfall Screening Data

St. Clair County Drain Office Outfall Screening Data

Drain Name	Receiving waters	Outfall_ID	Township	Dia-meter	Flow	Address	Odor	Col or	Turbidit y	Stain s	Float-ables	Deposits	Sur fact	Date_	Ecoli
Geyman	SC River	282-00	Cottreville	18"	N	South of 8769 M29	N	N	N	N	N	N	N	11/29/10	X
Lester Brammel	MDOT M-29	474-00	Cottreville	96"	Y	6915 M29 - Drain ends on the north side of M29.							N	11/29/10	14.5
Clippert	SC River	152-00	Cottreville	72"	Y	7337 M29.		N	N	green algae	N	N	N	11/29/10	2419.2
					N	Locked gate @ 7337 M29; access from s. neighbor	N	N	N	N	N	N	N	07/26/11	
Robbins	SC River	703-00	Cottreville	72"	N	8285 M28. Screen just w. of M29	N	N	N	N	N	N	N	11/29/10	42.1
MC Dredge Cut	SC River	512-00	Clay	120"	Y	M29, S. of Roberts Rd.	N	N	N	N	N	N	N	11/29/10	X
Harsens's Island	N. Channel of SC River	346-00	Clay	240"	Y	Accessible by N. Channel Drive	N	N	N	N	N	N	N	07/27/11	46.4
														08/04/11	50.4
														08/10/11	54.7
	Muscamoot Bay/ S. Channel			180"	Y	Accessible S. Channel Drive	N	N	N	N	N	N	N	07/26/11	65.7
Dana	N. Channel of SC River	200-00	Clay	120"	Y	E. of 2209 M29. Nxt to Algonac Harbor Club	N	N	N	N	N	N	N	11/29/10	X
Parker-Clay	N. Channel of SC River	637-00	Clay	32"	N	3831 M29.	N	N	N	N	N	N	N	07/26/11	X
Crocker	N. Channel of SC River	184-00	Clay	24"	Y	W. of 4743 Pte Tremble Road/ M29	N	N	N	Y	N	N	N	11/29/10	N
					Y		N	N	N	N	N	N	N	07/26/11	X

Drain Name	Receiving waters	Outfall_ID	Township	Dia-meter	Flow	Address	Odor	Col or	Turbidit y	Stain s	Float-ables	Deposits	Sur fact	Date_	Ecoli
Colony	N. Channel of SC River	156-00	Clay	48"	Y	5071 M29	N	N	N	N	N	N	N	11/29/10	21.6
Pearl Beach	Swartout Creek/ N. Channel SC River	647-00	Clay	20'	Y	just west of 5843	N	N	N	N	N	N	N	07/27/11	8
							N	N	N	N	N	N	N	08/04/11	36
							N	N	N	N	N	N	N	08/10/11	44
Beaubien	Beaubien Creek/ Bouvier Bay	044-00	Clay	15'	Y	Sampled at Starville Road-poor access at dischrg pt.	N	N	N	N	N	N	N	11/29/10	105.0
Bay	Bouvier Bay	040-00	Ira	240"	N	w. of 7795 M-29. w. of Perch Rd.	N	N	N	N	N	N	N	11/29/10	X
Demars	Bouvier Bay	206-00	Ira	24"	Y	8242 M29	N	N	N	N	N	N	N	11/29/10	613.1
Hammer	Bouvier Bay	334-00	Ira	24"	Y	just south of 8336 M29	N	N	N	N	N	N	N	11/29/10	1299.7
					N		N	N	N	N	N	N	N	07/27/11	X
Palms	Bouvier Bay	635-00	Ira	240"	Y	west of 7720 M29, Ira Township (e. of Palms Rd.)	N	N	N	N	N	N	N	11/29/10	76.6
St. Mary's	Swan Creek	798-00	Ira	120"	Y	8758 Vernier Road	N	N	N	N	N	N	N	11/29/10	108.1
Schmidt	Meldrum Creek	722-00	Ira	2'	Y	e. of Meldrum Road between Arnold Rod and Shortcut	N	N	N	N	N	N	N	11/29/10	N
Meldrum	Meldrum Creek	536-00	Ira	10'	Y	S. of MC Hwy & w. of Hessen	N	N	N	N	N	N	N	11/29/10	N

Drain Name	Receiving waters	Outfall_ID	Township	Dia-meter	Flow	Address	Odor	Col or	Turbidity	Stains	Float-ables	Deposits	Sur fact	Date_	Ecoli
Marsac	Marsac Creek	514-00	Ira	15'	Y	N. of M-29, s. of MHP	N	N	N	N	N	N	N	11/29/10	344.1
Pelton	Abay	649-00	Ira	2'	0	Church rd. N. of M-29	N	N	N	N	N	N	N	11/29/10	41.3
Crapeau	Crapau Creek	182-00	Ira	6'	Y	County Line Road s. of Arnold	N	N	N	N	N	N	N	11/29/10	N
Casco	Swan Creek	136-00	Casco	2'	Y	N. of MC Hwy and W. of Palms Rd.	N	N	N	N	N	N	N	11/29/10	N

St. Clair County Road Commission Outfall Screening Data

Road Crossing	Receiving waters	Outfall ID	Township	Material	Diameter	Flow	Address	Odor	Color	Turbidity	Stains	Floatables	Deposits	Surfactants	Date	Ecoli
MC Highway (b/w Hessen and Palms)	Swan Creek	CA05	Casco	constructed ditch	12"	N	NE side - well vegetated swale.	N	N	N	N	N	N	N	07/13/11	N
Hessen Rd. (N. of Arnold)	Meldrum Creek	IR01	Ira	vegetation	0	N	No clear drainage path on any side of crossing - sheet runoff through dense vegetation	N	N	N	N	N	N	N	07/13/11	N
Arnold Rd. (W. of Hessen.)	Swan Creek	IR02	Ira	vegetation	0	N	No clear drainage path on any side of crossing - sheet runoff through dense vegetation	N	N	N	N	N	N	N	07/13/11	N
Arnold Rd. (E. of Meldrum)	Meldrum Creek	IR03	Ira	vegetation	0	N	NE side - sheet runoff through dense vegetation	N	N	N	N	N	N	N	07/13/11	N
Short Cut Rd. (E. of Meldrum)	Meldrum Creek	IR04_1	Ira	vegetation	0	N	NE side - sheet runoff through dense vegetation	N	N	N	N	N	N	N	07/13/11	N
		IR04_2			0	N	SW side - sheet runoff through dense vegetation	N	N	N	N	N	N	N	07/13/11	N
Shortcut Rd. (E. of Hessen)	Swan Creek	IR05_1	Ira	constructed swale	12"	N	SW side - vegetated swale to rip rap.	N	N	N	N	N	N	N	07/13/11	N
		IR05_2	Ira		0	N	SE side - sheet runoff through dense vegetation	N	N	N	N	N	N	N	07/13/11	N
Ira Rd. (N. of M29)	Swan Creek	IR06_1	Ira	vegetation	0	N	SE side - sheet runoff through dense vegetation	N	N	N	N	N	N	N	07/13/11	N

Road Crossing	Receiving waters	Outfall_ID	Township	Material	Diameter	Flow	Address	Odor	Color	Turbidity	Stains	Floatables	Deposits	Surfactants	Date	Ecoli
		IR06_2			0	N	SW - sheet runoff through dense vegetation	N	N	N	N	N	N	N	07/13/11	N
		IR06_3			0	N	NW - sheet runoff through dense vegetation	N	N	N	N	N	N	N	07/13/11	N
		IR06_4			0	N	NE - sheet runoff through dense vegetation	N	N	N	N	N	N	N	07/13/11	N

Algonac MS4 Discharge Point Screening Data

Outfall ID	Material	Dia-meter	Flow	Odor	Color	Turbidity	Stains	Floatables	Deposits	Date
01	Other	7ft	0	None	None	None	Brown	None	None	07/22/10
02	RCP	36in	0	None	None	None	None	None	None	07/22/10
04	CMP	16IN	.1	None	None	None	None	None	None	07/22/10
05	RCP	12IN	0	None	None	None	None	None	None	07/22/10
06	CMP	16IN	0	None	None	None	None	None	None	07/22/10
07	Metal	10IN	0	None	None	None	None	None	None	07/22/10
08	Metal	18IN	0	None	None	None	None	None	None	07/22/10
15	CMP	6IN	0	None	None	None	None	None	None	07/22/10
14	Clay	8in	0	None	None	None	None	None	None	07/22/10
13	CMP	12in	0	None	None	None	None	None	None	07/22/10
12	CMP	12in	0	None	None	None	None	None	None	07/22/10
11	Metal	12in	0	None	None	None	None	None	None	07/22/10
09	Metal	8IN	0	None	None	None	None	None	None	07/22/10
10	Metal	6in	0	None	None	None	None	None	None	07/22/10
44	RCP	10IN	0	None	None	None	None	None	None	07/22/10
16	Unknown	unk	0	None	None	None	None	None	None	07/22/10
17	RCP	8in	0	None	None	None	None	None	None	07/22/10
18	Metal	30in	0	None	None	None	None	None	None	07/22/10
19	Metal	24in	0	None	None	None	None	None	None	07/22/10
20	Metal	8in	0	None	None	None	None	None	None	07/22/10
21	Metal	4in	0	None	None	None	None	None	None	07/22/10
22	Metal	6in	0	None	None	None	None	None	None	07/22/10
24	Metal	12in	0	None	None	None	None	None	None	07/22/10
23	Metal	6in	0	None	None	None	None	None	None	07/22/10
25	Metal	12in	0	None	None	None	None	None	None	07/22/10
26	RCP	10in	0	None	None	None	None	None	None	07/22/10
27	CMP	12in	0	None	None	None	None	None	None	07/22/10
28	Metal	8IN	0	None	None	None	None	None	None	07/22/10
31	Metal	10IN	0	None	None	None	None	None	None	07/22/10
29	Metal	12in	0	None	None	None	None	None	None	07/22/10
30	Metal	4in	0	None	None	None	None	None	None	07/22/10

Outfall ID	Material	Dia-meter	Flow	Odor	Color	Turbidity	Stains	Floatables	Deposits	Date
33	Metal	12in	0	None	None	None	None	None	None	07/22/10
34	CMP	12in	0	None	None	None	None	None	None	07/22/10
37	RCP	18in	0	None	None	None	None	None	None	07/22/10
35	RCP	18in	0	None	None	None	None	None	None	07/22/10
36	RCP	18in	0	None	None	None	None	None	None	07/22/10
40	PVC	10in	0	None	None	None	None	None	None	07/22/10
39	PVC	10in	0	None	None	None	None	None	None	07/22/10
41	Corr Plastic	18in	0	None	None	None	None	None	None	07/22/10
03	CMP	18in	0	None	None	None	None	None	None	01/00/00
43	RCP	18in	0	None	None	None	None	None	None	01/00/00
32	unk	12in	0							01/00/00
38	Clay	18in	0							01/00/00
45	RCP	30in	0	None	None	None	None	None	None	01/00/00
47	RCP	12in	0	None	None	None	None	None	None	01/00/00
46	RCP	36in	0	None	None	None	None	None	None	01/00/00

Ira Township MS4 Discharge Point Screening Data

Outfall_ID	Receiving waters	Material	Diameter	Flow	Address/ Location description	Odor	Color	Turbidity	Stains	Floatables	Deposits_s	Surfact__p	Date_	Ecoli
Ira01	Meldrum Creek	PVC	4"	N	Culvert south of the maintenance bldg.	N	N	N	N	N	N	N		N
Ira02	Meldrum Creek	Iron	2"	N	Culvert east of water treatment plant	N	N	N	N	N	N	N		N
Ira03	SCCRC - Meldrum Road	Metal CB		N	Across from Ira Township Hall entrance	N	N	N	N	N	N	N		N
Ira04	SCCRC - Meldrum Road	Metal CB		N	Just south of Fire Station	N	N	N	N	N	N	N		N
Ira05	SCCRC - Meldrum Road	Metal CB		N	West of Fire Station	N	N	N	N	N	N	N		N

Clay Township MS4 Discharge Point Screening Data

Outfall_ID	Receiving waters	Material	Diameter	Flow	Address/ Location description	Odor	Color	Turbidity	Stains	Floatables	Deposits_s	Surfact__p	Date_	Ecoli
TH-1	MDOT - M29	Catch Basin		N	Township Hall	N	N	N	N	N	N	N	07/26/11	N
WD-N1	SCCRC - Ainsworth Rd.	Catch Basin		N	Water Department	N	N	N	N	N	N	N	07/26/11	N
WD-S2	SCCRC - Ainsworth Rd.	Catch Basin		N	Water Department	N	N	N	N	N	N	N	07/26/11	N
FD-S1	SCCRC - Ainsworth Rd.	Catch Basin		N	Fire Department	N	N	N	N	N	N	N	07/26/11	N
FD-N2	SCCRC - Ainsworth Rd.	Catch Basin		N	Fire Department	N	N	N	N	N	N	N	07/26/11	N
HIFD-1	SCCRC- LaCroix Rd.	CMP		N	Harsens Island Fire Department	N	N	N	N	N	N	N	07/26/11	N
TP-1	MDOT - M29	Catch Basin		N	Township Park	N	N	N	N	N	N	N	07/26/11	N

Outfall_ID	Receiving waters	Material	Diameter	Flow	Address/ Location description	Odor	Color	Turbidity	Stains	Floatables	Deposits_s	Surfact__p	Date_	Ecoli
TP-2	MDOT - M29	Catch Basin		N	Township Park	N	N	N	N	N	N	N	07/26/11	N
TP-3	MDOT - M29	Catch Basin		N	Township Park	N	N	N	N	N	N	N	07/26/11	N
TP-4	MDOT - M29	Catch Basin		N	Township Park	N	N	N	N	N	N	N	07/26/11	N
TP-5	MDOT - M29	Catch Basin		N	Township Park	N	N	N	N	N	N	N	07/26/11	N
TP-6	MDOT - M29	Catch Basin		N	Township Park	N	N	N	N	N	N	N	07/26/11	N
TP-7	MDOT - M29	Catch Basin		N	Township Park	N	N	N	N	N	N	N	07/26/11	N

Appendix D.
***E. coli* Sediment Sampling Memorandum**

To: Kristen O'Reilly, Storm Water Coordinator, St. Clair County Health Department

From: Meghan Price, Senior Associate Scientist, Environmental Consulting & Technology, Inc.

Re: **Sediment Sampling for *E. coli* within Anchor Bay Watershed**

Date: September 16, 2011

At your request, Environmental Consulting & Technology, Inc. (ECT) completed an analysis of the *E. coli* concentration in the sediment at four sites within the Anchor Bay Watershed to determine if the sediment could be impacting *E. coli* water column values if resuspended. This effort was carried out in response to the number of erosion issues and stream obstructions found during the 2011 nonpoint surveys, and due to the journal articles that have documented high *E. coli* densities in sediment. The theory being that if high sediment *E. coli* was found, then it is likely captured in water column samples when the sediment is disturbed, either through high flows or by foot traffic. Sample collection was conducted on 08/02/11. The weather was 85°F, mostly cloudy, and wind was about 5 MPH. Antecedent conditions were dry.

Sediment samples were collected from the Meldrum Drain at Arnold Road, Marsac Creek at Arnold Road, Swartout Creek at Phelps Road, and Crapau Creek at County Line Road and analyzed for *E. coli*. At each site, three distinct sediment samples were collected using a stainless steel spoon. Each of the samples were homogenized in a stainless steel bowl and transferred into 4 oz. sample jars. Prior to sample collection, the spoon and bowl were wiped down with bleach. In between each of the three samples, the spoon and bowl were rinsed with site water and then wiped with bleach to prevent cross-contamination between samples. One duplicate sample was collected. A total of 13 sample jars were kept in a cooler with ice prior to being delivered to Paragon Laboratories, Inc. in Livonia, MI.

The scientists at Paragon added 10 g of sample to 90 mL of sterile deionized water, and shook vigorously; effectively creating a leachate (1/10 dilution of original material). 10 mL of the liquid portion of the leachate was then added to another 90 mL dilution bottle creating the usable dilution (1/10 dilution of the leachate). The dilution was then processed using colilert-18 with the quanti-tray2000. The results were given as MPN/g and are displayed in Table 1 below. To give a better understanding of what that unit means, a paperclip weighs about 1 gram. Therefore, in sediment that weighs about the same as a paperclip, there were over 4,000 live/viable *E. coli* colonies at three of our four monitoring sites.

Table 1 – Laboratory Results for *E. coli* in Sediment of Four Anchor Bay Tributaries

Site Description	Site ID	Sample	Sediment Description	<i>E. coli</i> (MPN/g)	Site Geometric Mean (MPN/g)	Other comments
Marsac Creek @ Arnold Road	M24	-A	mostly clay	4,106	973	
		-B	mostly clay	624		
		-C	mostly clay	359		
Meldrum Creek @ Arnold Road	M51	-A	clay with some sand	327	702	
		-B	clay with some sand	122		
		-C	clay with some sand	8,664		
Swartout Creek @ Phelps Road	M37	-A	clay	5,794	357	Strong sewage odor when sediment was disturbed.
		-B	clay	85		
		-B-d	clay	121		
		-C	clay	272		
Crapeau Creek @ County Line Road	46.3	-A	clay	10	28	There were numerous muskrat holes at this location. Dry weather flow coming from outfall on south side of creek
		-B	clay	10		
		-C	clay	231		

As one would expect, the results demonstrate a variability in the concentrations of bacteria in samples collected within 5-10 feet of each other. The *E. coli* results did not correlate with the odor in the sediment at Swartout Creek (M37) nor the observed wildlife at Crapeau Creek (46.3). The results for Crapeau Creek were notably lower than the other sites, and are the same order of magnitude with the concentrations found at the Main Street bridge (about 1.5 miles south of

46.3) as reported in *An Evaluation of Anchor Bay Watershed Planning Activities and Monitoring Data 2003 – 2008: An addendum to Chapter 6 Methods of Measuring Progress, Anchor Bay Watershed Management Plan*. The other three sites had notably higher sediment *E. coli* counts.

In order to calculate the maximum impact the *E. coli* can have while residing in the sediment, the following assumptions were made:

1. There is a 1:1 correlation between suspended sediment concentrations and *E. coli* water column concentrations;
2. The total suspended solids concentration was 730 mg/l based on the maximum value found at any site during the Lake St. Clair Regional Monitoring Project;
3. The maximum sediment *E. coli* concentration was 8,644 MPN/g based on the recent monitoring data (Table 1).

The following equation is used in order to estimate how the *E. coli* concentration in sediment could impact the *E. coli* concentration in the water column:

$$8,664 \frac{\text{MPN}}{\text{g}} \times 730 \frac{\text{mg}}{\text{L}} \times \frac{1\text{L}}{1,000\text{mL}} \times \frac{1\text{g}}{1,000\text{mg}} = 632 \frac{\text{MPN}}{100\text{mL}}$$

Therefore, given our assumptions, resuspended sediment could add up to 630 MPN/100 mL of *E. coli* to the water column. This would result in an exceedence of the water quality standard of 300 CFU/100mL.

Additional sampling should be conducted to better support this conclusion. You may consider collecting water samples for TSS and *E. coli* at the same location/time that sediment samples are collected for *E. coli* analysis.

If you have any questions on this data collection effort, please contact me at 586-296-1010 or at mprice@ectinc.com.

Appendix E.

Results and Maps of the 2011 Nonpoint Source Survey for Crapau, Marsac, Meldrum and Swartout Creeks

Crapau Creek: 2011 Nonpoint Source Survey Summary

Cause/Type	Instances of				
	Erosion Issues		Obstructions	Dumping	Encroachment
	Streambank	Upland			
Excessive Flow					
No Buffer					
Log Jam					
Ag-related					
Wildlife					
Horse crossing					
Natural (Minor)			2		
Natural (Major)					
Man-made (Major)					
Man-made (Minor)					
Grass Clippings					
Firewood					
Permanent (Non-Ag.)					

Marsac Creek: 2011 Nonpoint Source Survey Summary

Cause/Type	Instances of				
	Erosion Issues		Obstructions	Dumping	Encroachment
	Streambank	Upland			
Excessive Flow	16	1			
No Buffer	9				
Log Jam	5				
Ag-related					
Wildlife					
Horse crossing					
Natural (Minor)			20		
Natural (Major)			9		
Man-made (Major)			3		
Man-made (Minor)					
Grass Clippings				1	
Firewood					
Permanent (Non-Ag.)					1

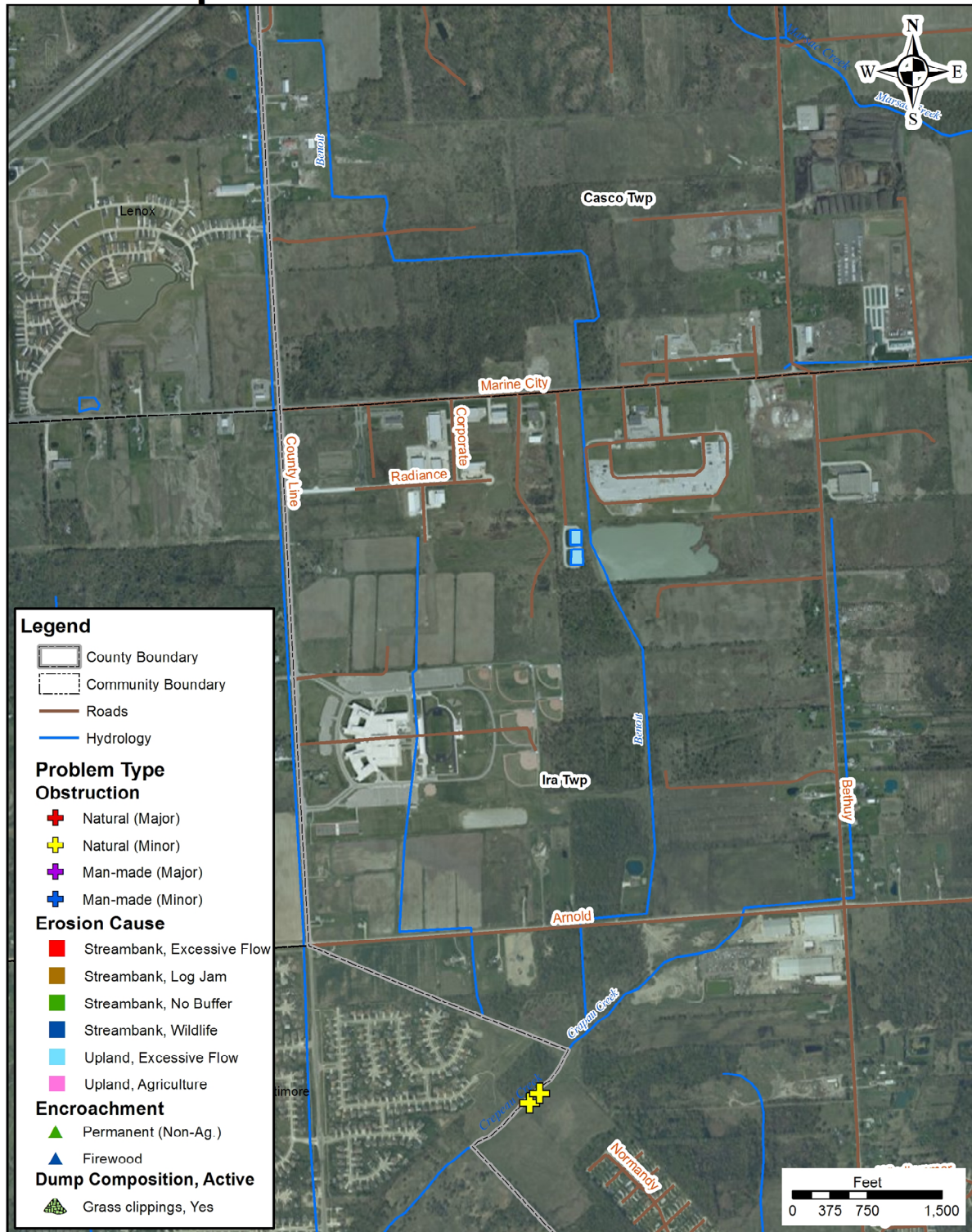
Meldrum Creek: 2011 Nonpoint Source Survey Summary

Cause/Type	Instances of				
	Erosion Issues		Obstructions	Dumping	Encroachment
	Streambank	Upland			
Excessive Flow	114	1			
No Buffer	2	1			
Log Jam	65				
Ag-related	8	7			
Wildlife	1				
Horse crossing	1				
Natural (Minor)			71		
Natural (Major)			72		
Man-made (Major)			3		
Man-made (Minor)			10		
Grass Clippings					
Firewood					1
Permanent (Non-Ag.)					

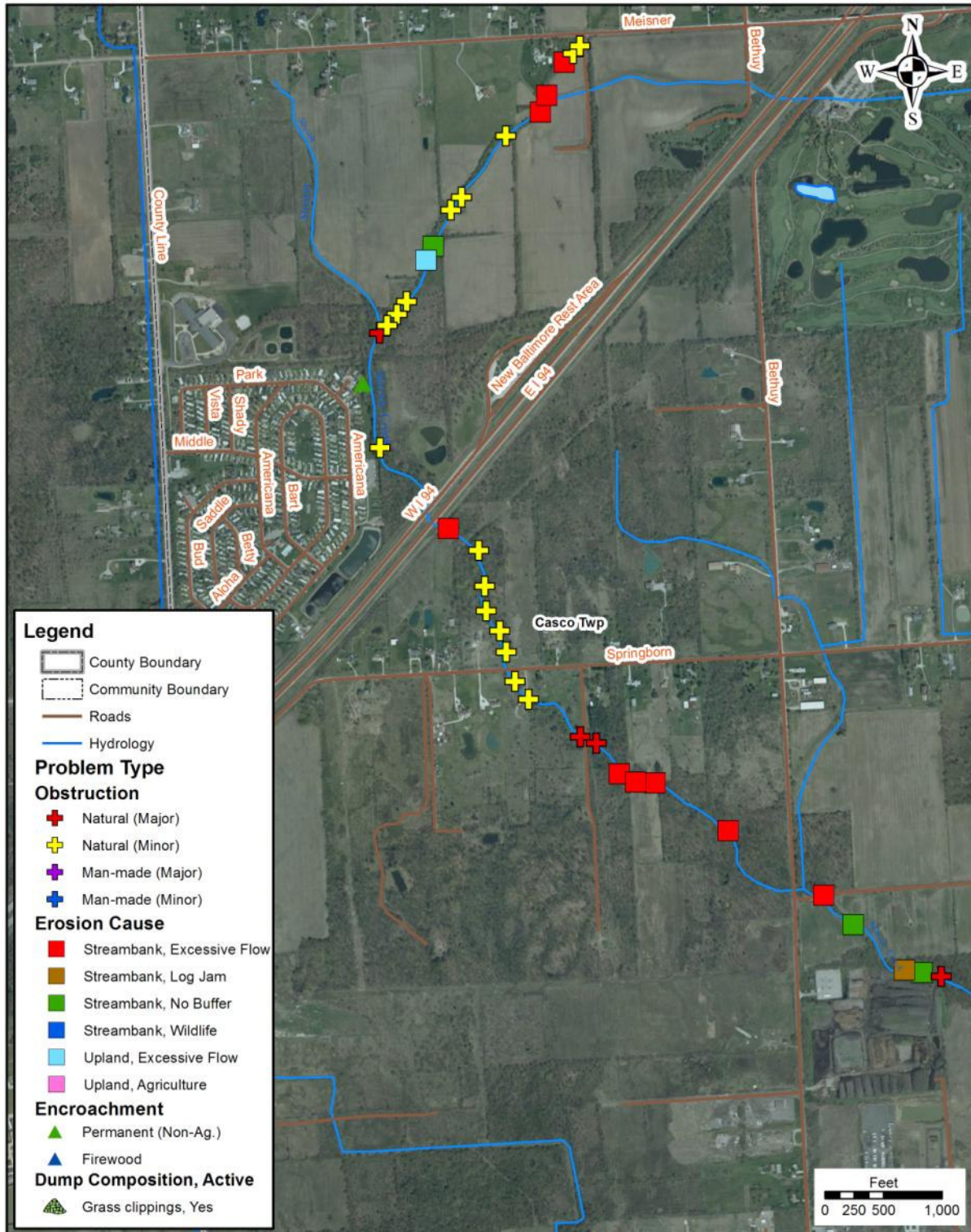
Swartout Creek: 2011 Nonpoint Source Survey Summary

Cause/Type	Instances of				
	Erosion Issues		Obstructions	Dumping	Encroachment
	Streambank	Upland			
Excessive Flow					
No Buffer					
Log Jam	21				
Obstructions	9				
Ag-related					
Wildlife					
Horse crossing					
Natural (Minor)			20		
Natural (Major)			28		
Man-made (Major)			1		
Man-made (Minor)			4		
Grass Clippings				1	
Firewood					
Permanent (Non-Ag.)					

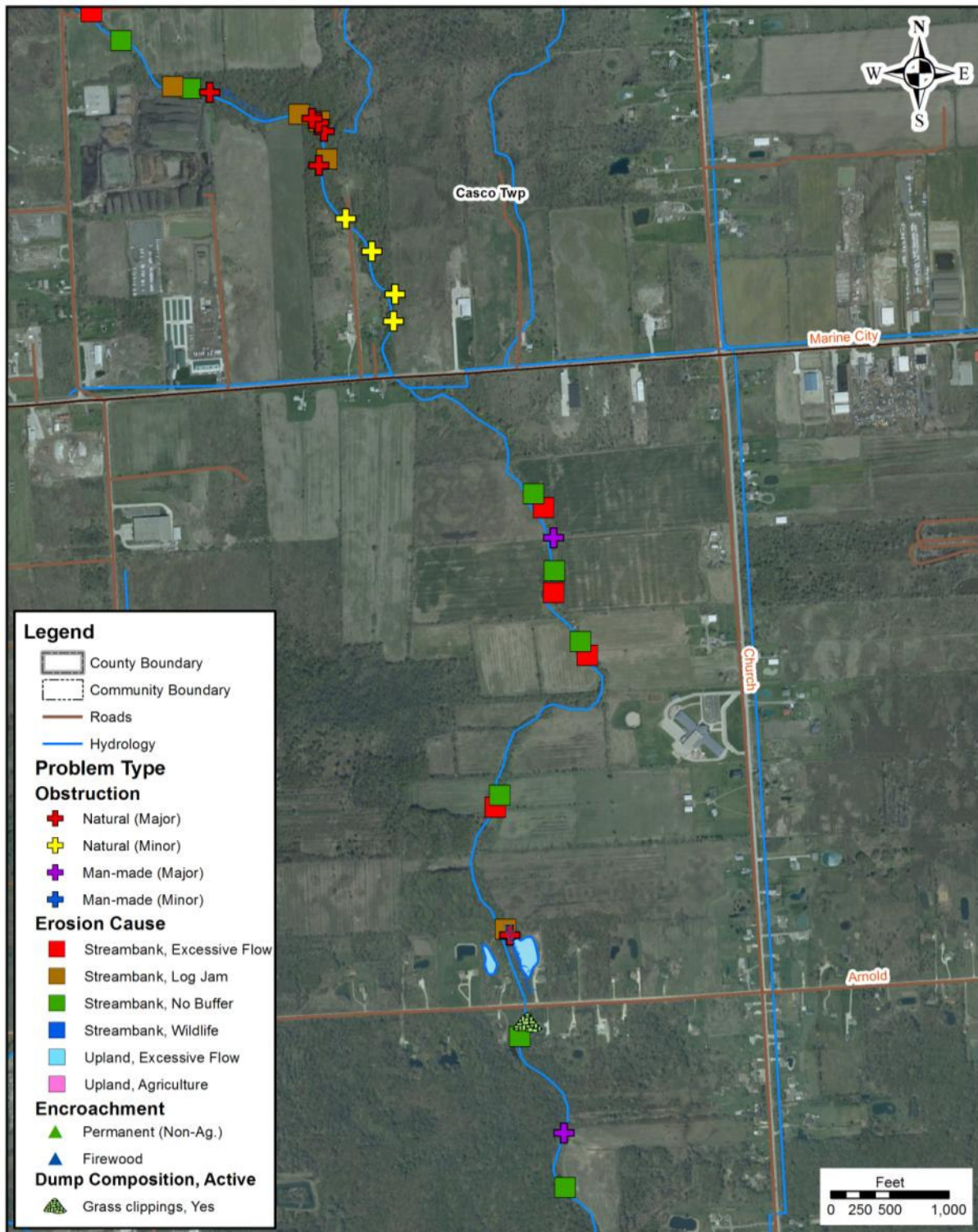
Crapau Creek Nonpoint Source Survey Results



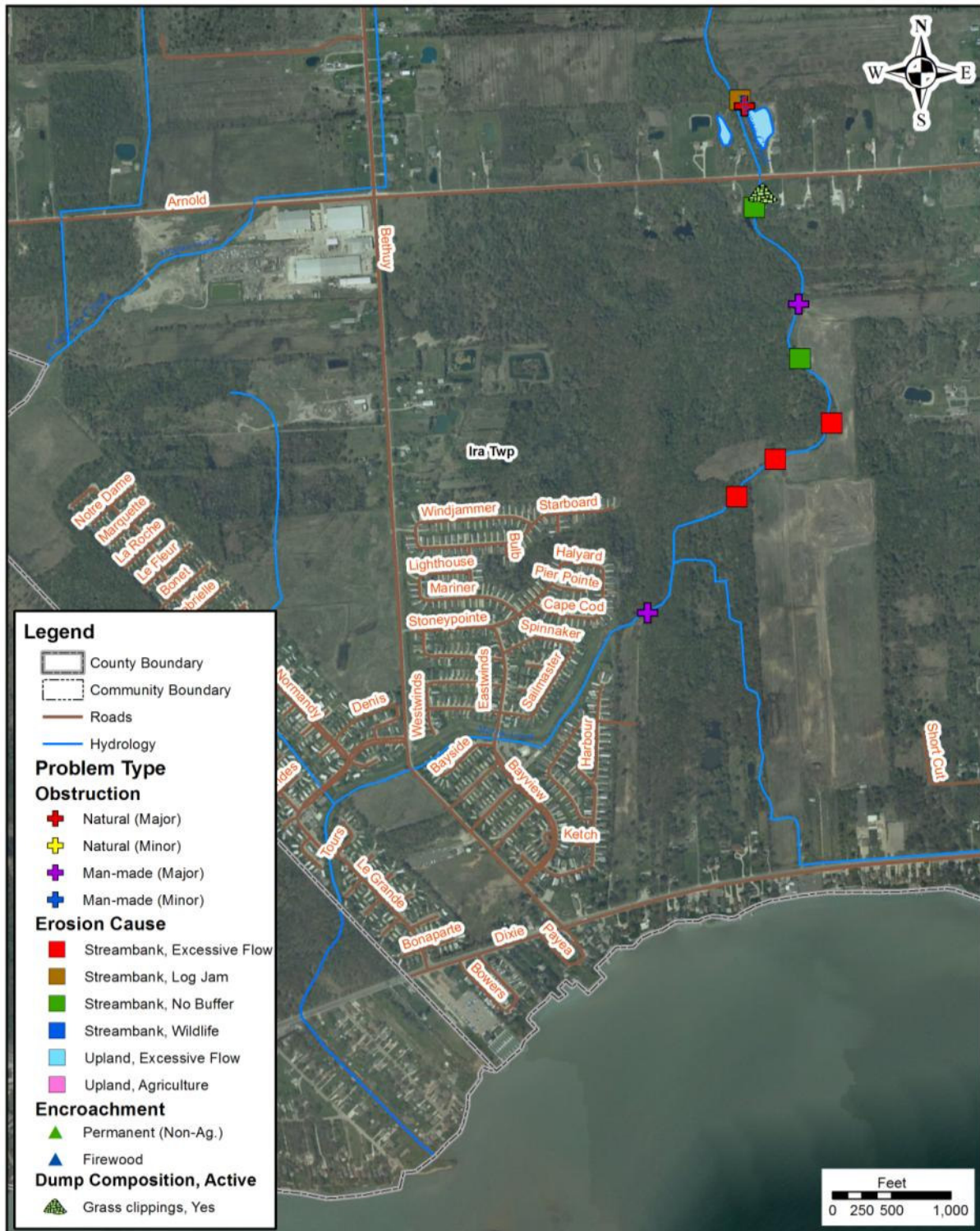
Marsac Creek Nonpoint Source Survey Results (Meisner Rd to Bethuy Rd)



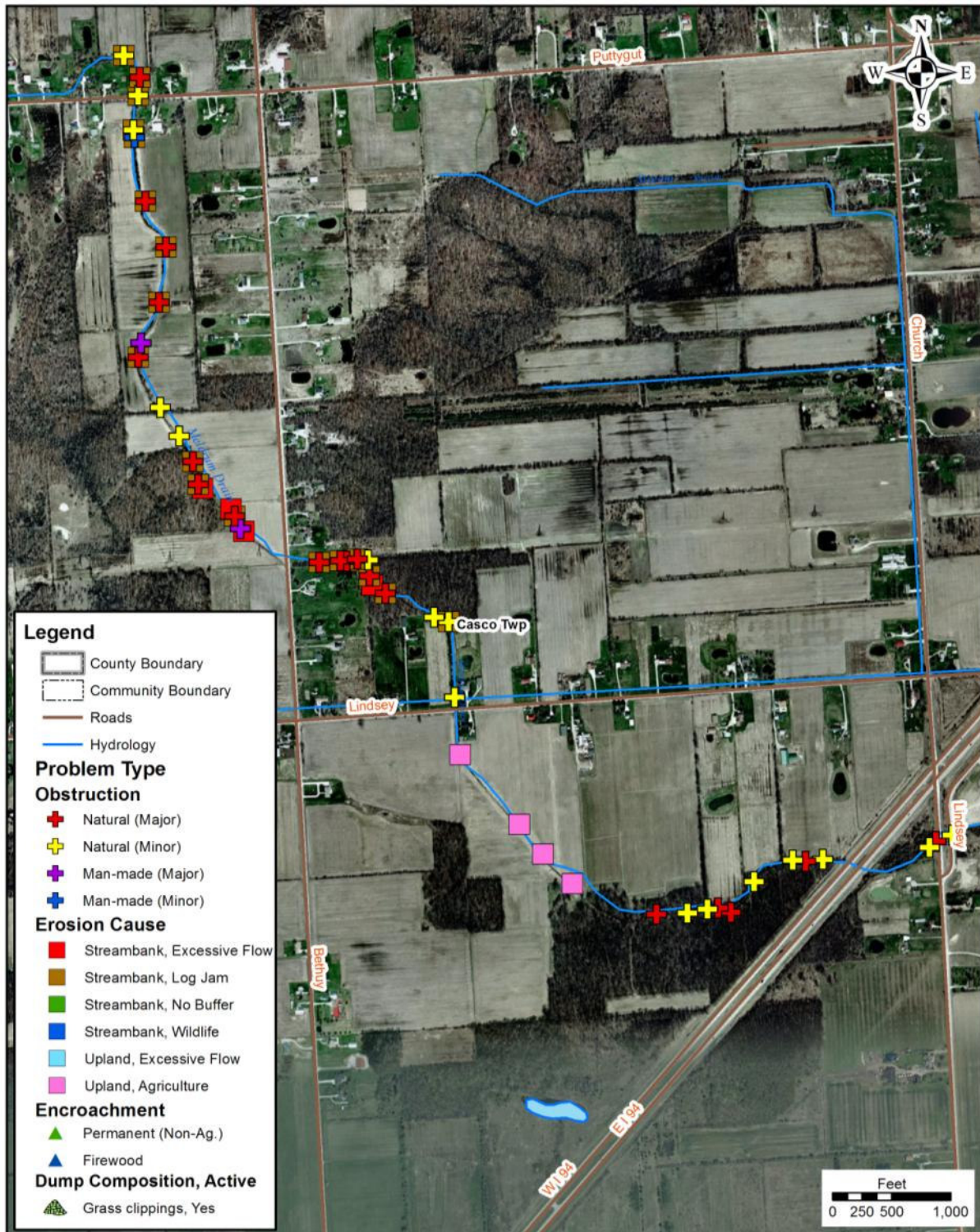
Marsac Creek Nonpoint Source Survey Results (Bethuy Rd to Arnold Rd)



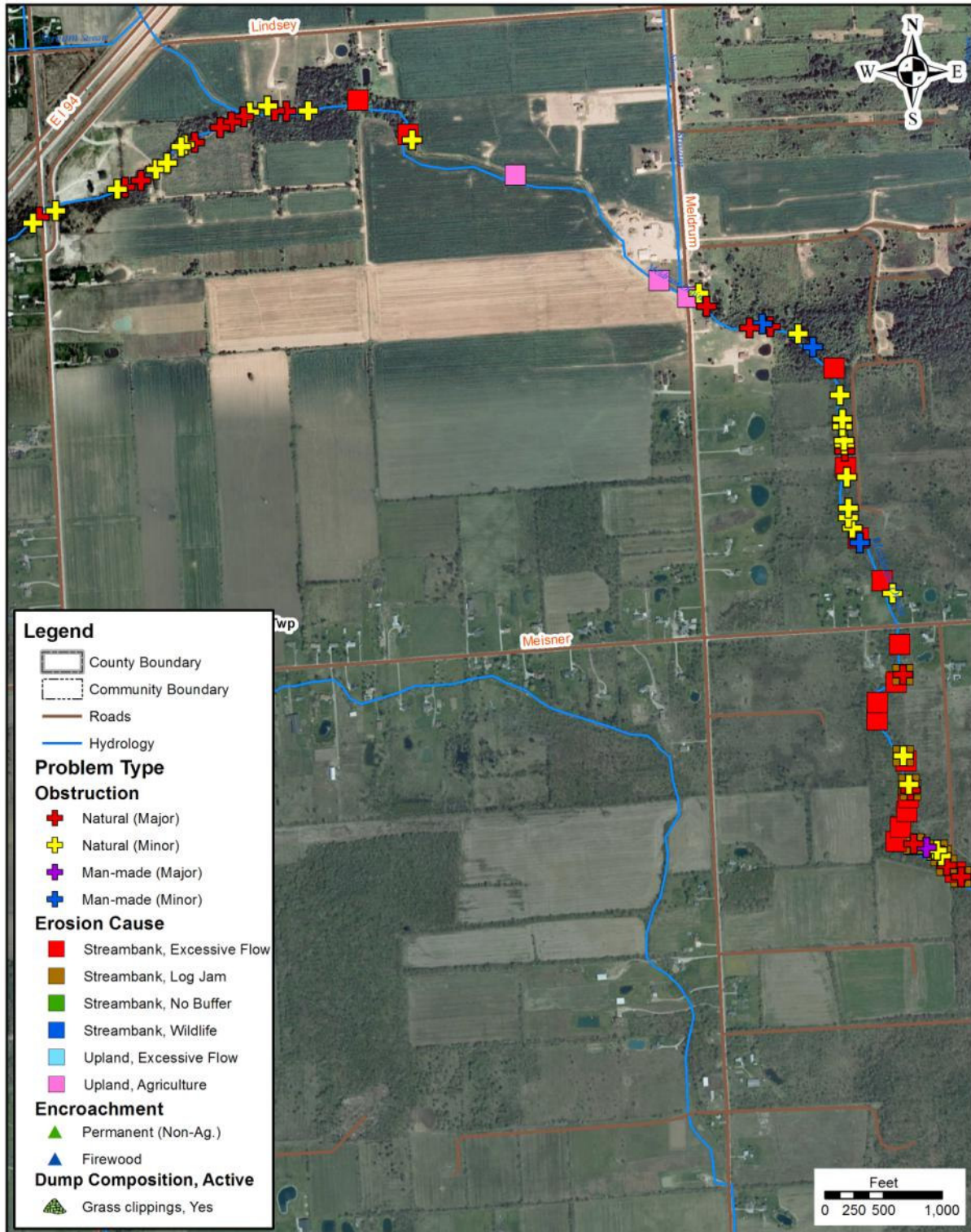
Marsac Creek Nonpoint Source Survey Results (Arnold Rd to outlet)



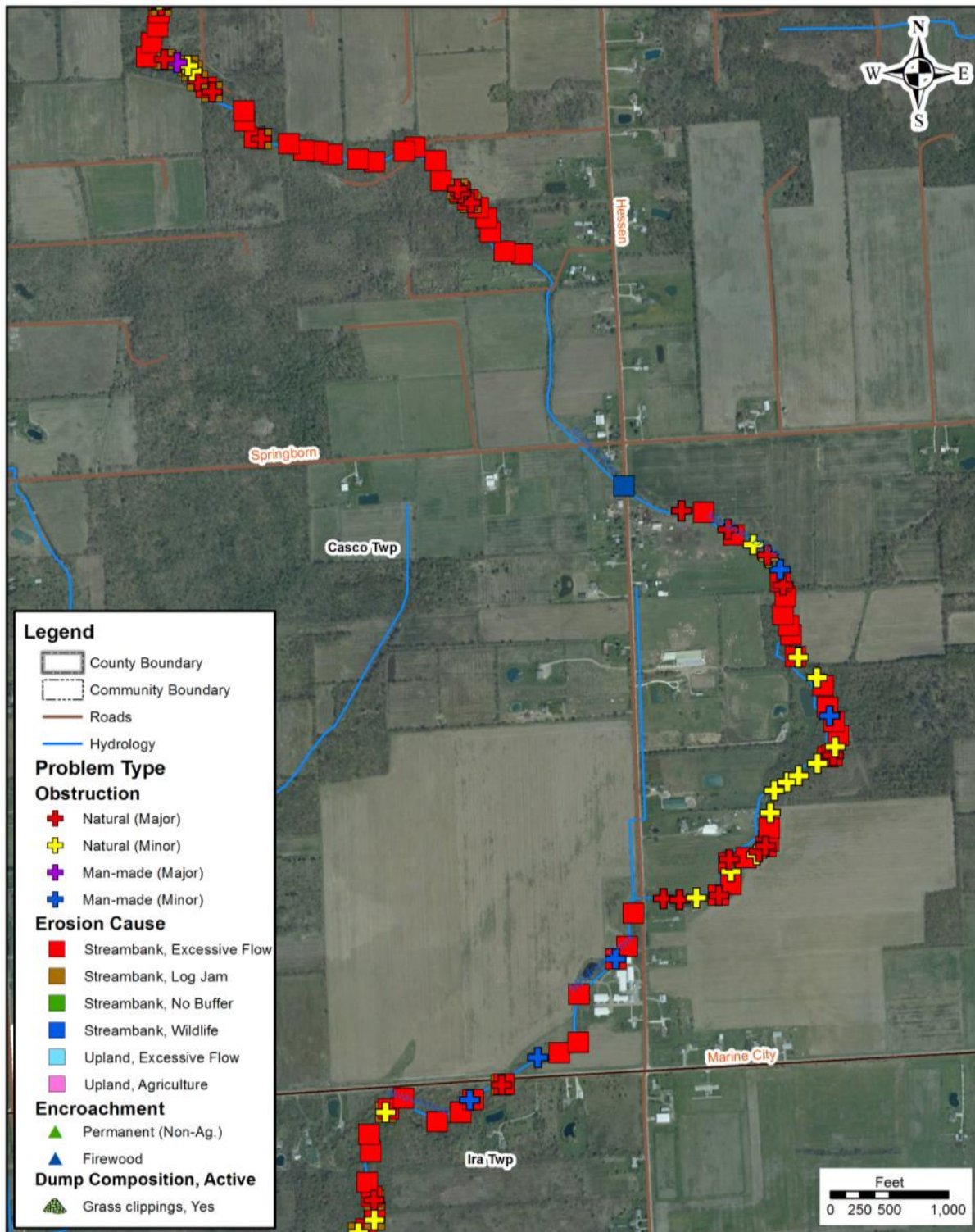
Meldrum Creek Nonpoint Source Survey Results (Puttygut Rd to I-94)



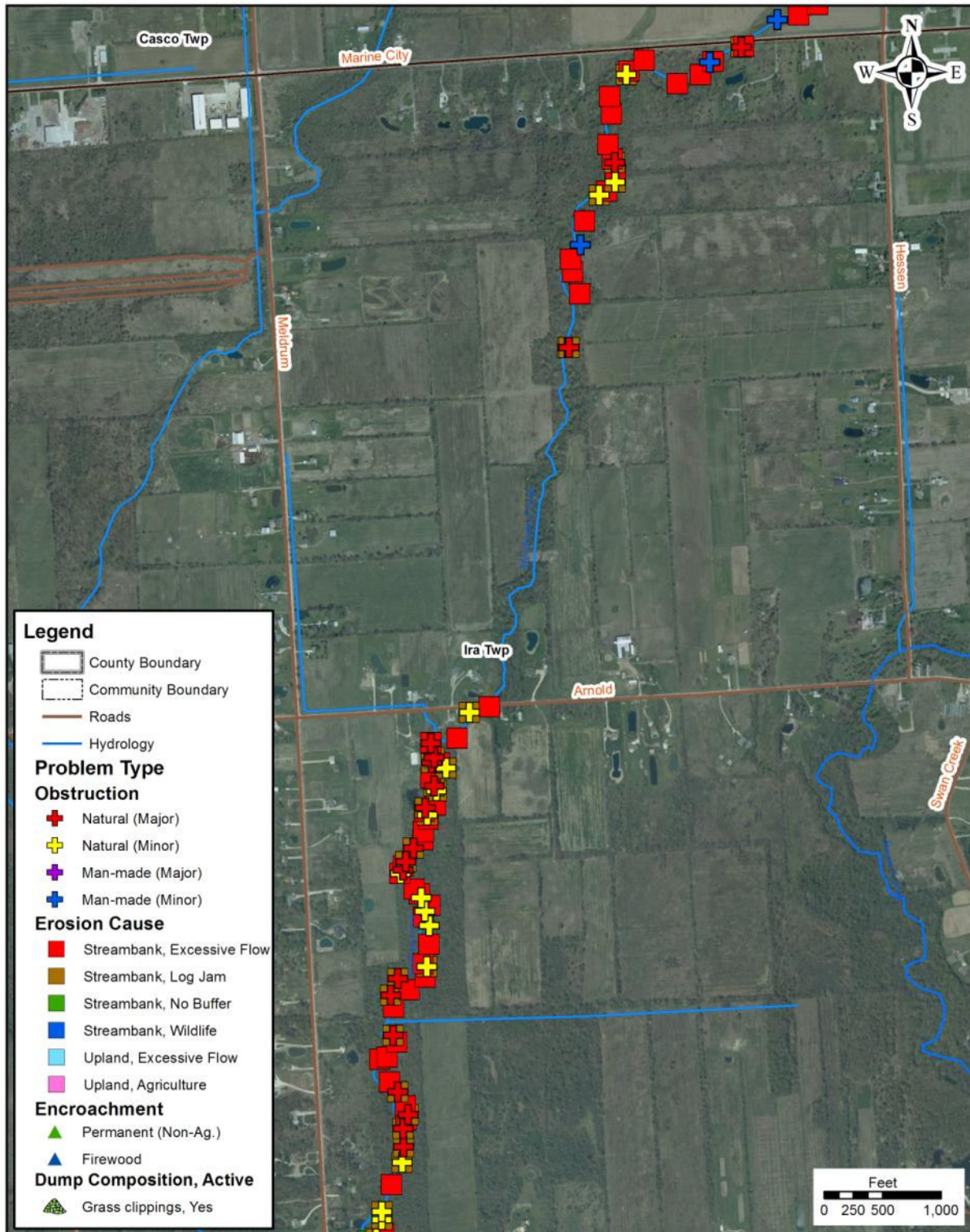
Meldrum Creek Nonpoint Source Survey Results (I-94 to south of Meisner Rd)



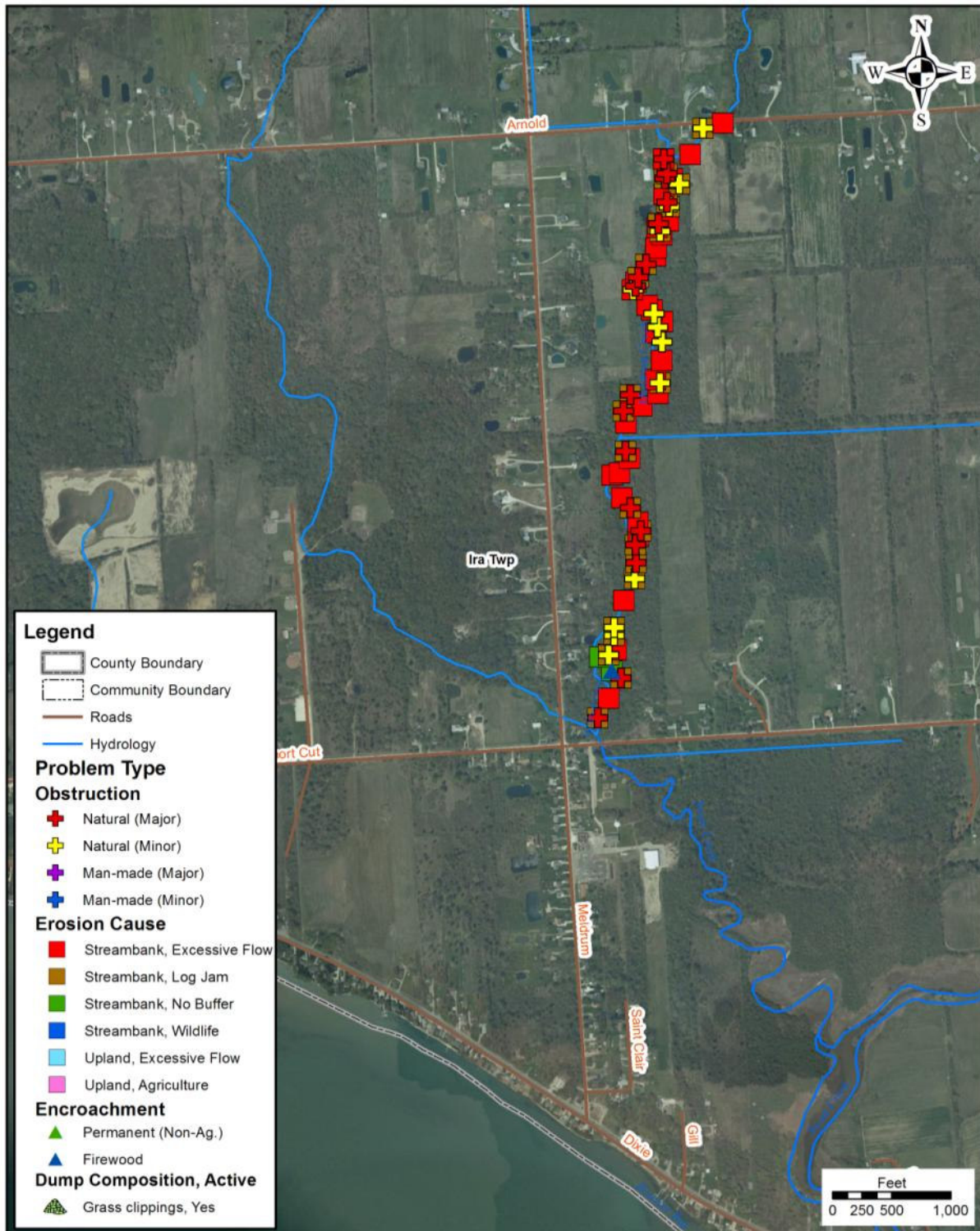
Meldrum Creek Nonpoint Source Survey Results (north of Meisner Rd to Marine City Hwy)



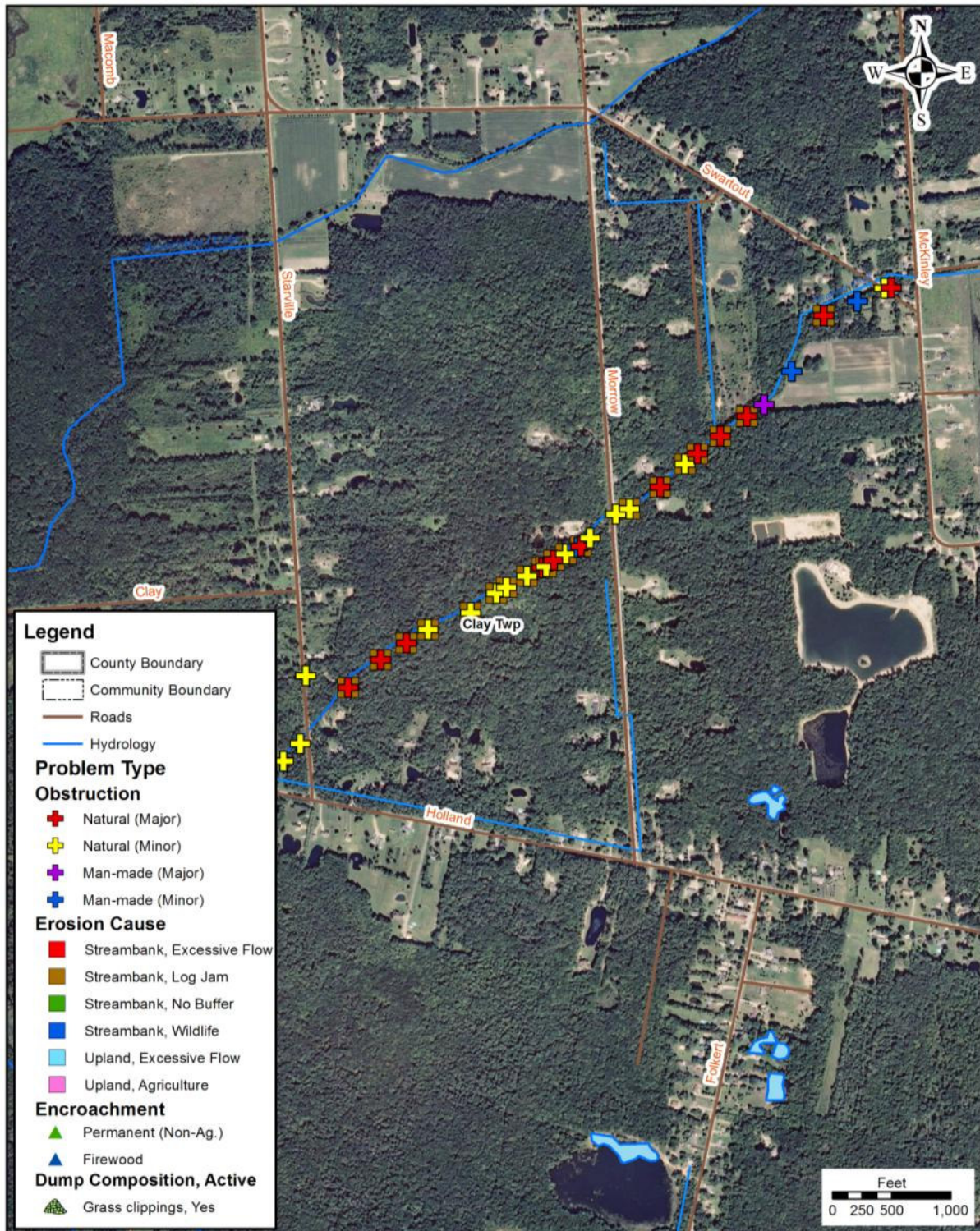
Meldrum Creek Nonpoint Source Survey Results (Marine City Hwy to Arnold Rd)



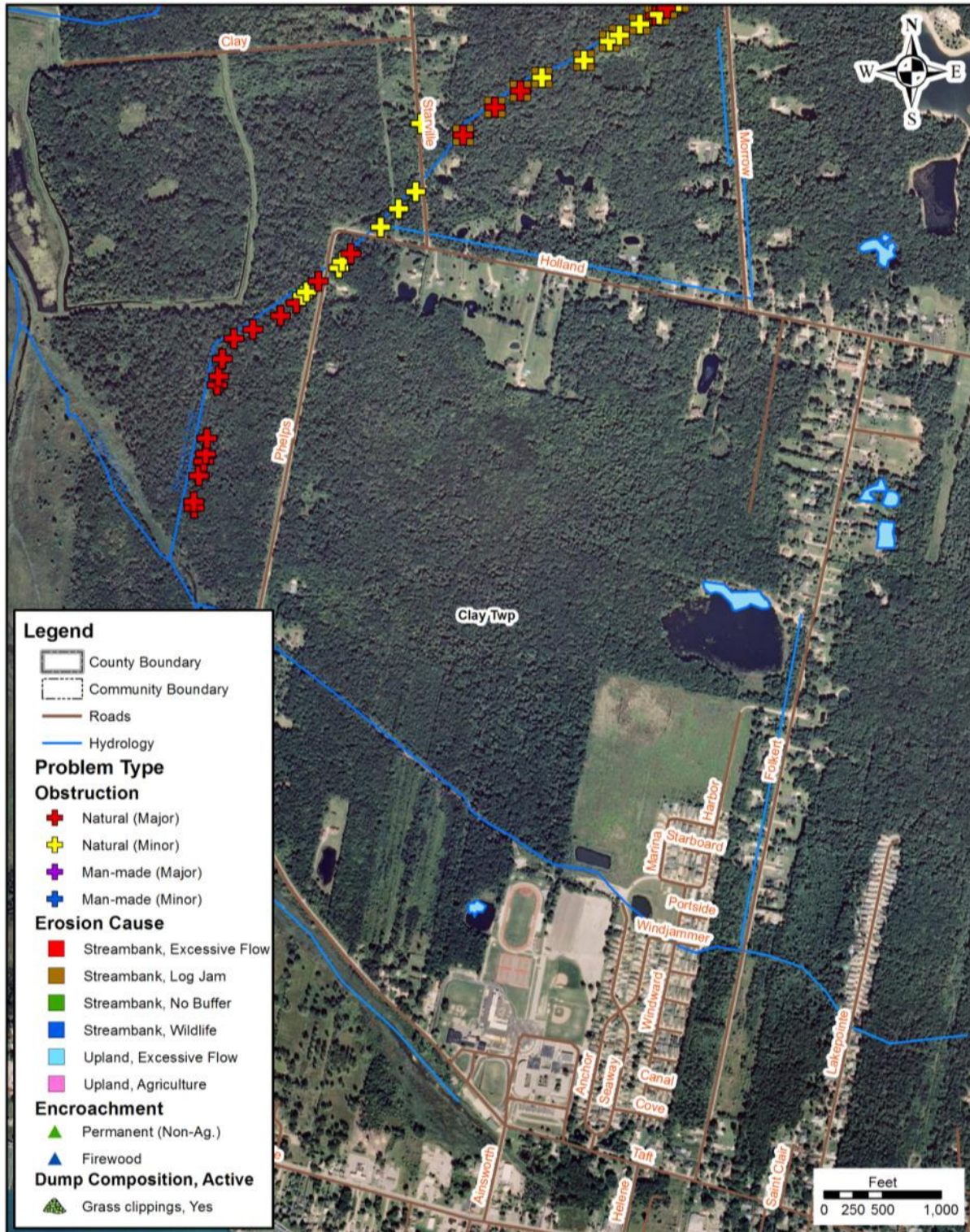
Meldrum Creek Nonpoint Source Survey Results (Arnold Rd to Shortcut Rd)



Swartout Creek Nonpoint Source Survey Results (McKinley Rd to Starville Rd)



Swartout Creek Nonpoint Source Survey Results (Starville Rd to outlet)



Description of Nonpoint Source Database

Characteristic

Notes

Erosion Type

- Streambank (> 20 feet of eroded bank)
- Upland (overland wash outs > 3 feet in diameter)
- None (default)

Erosion Cause

- Excessive flow (scouring the banks)
- Undersized culvert (backing up water at road crossings)
- Log jam (across the stream)
- No buffer (for overland runoff)
- Ag-related (created by livestock access, etc.)
- Trash (manmade debris across the stream)
- Wildlife (from burrowing)
- Other
- None (default)

Type of Obstruction (objects that are blocking water flow)

- Natural (major) (ex: stream completely blocked by fallen trees)
- Natural (minor)
- Man-made (major)
- Man-made (minor) (ex: stream partially blocked by urban debris (cars, shopping carts, etc.)
- None (default)

Major, if 100% blocked
Minor, if 50 - 100% blocked
Do not record if less than 50% blocked

Dump Composition (illegal or historic dump sites that contain items that people have disposed)

- Household (primarily comprised of household trash)
- Metal
- Wood
- Toxic
- Yard waste
- Pet waste
- Other
- None (default)

Only record if larger than what can fit into a wheelbarrow.
Look for these problems outside of the drain banks but within the drain easement.

Active Dump

- Yes
- No
- None (default)

Yes, if it looks that material has been added recently.
No, if a historic abandoned dump

Encroachment Type (for items being stored too close to the drain)

- Permanent (Ag) (barn, chicken coop, etc.)
- Permanent (Non-Ag) (storage shed, swimming pool, etc.)

Temporary items

- Manure (piled or stored within the easement)
- Building materials
- Firewood
- Vehicles/equipment
- Temporary other
- None (default)

Look for problems within the drain easement or 40 feet from the drain centerline if the easement is unknown. Select "Temporary" if the object can be easily moved.