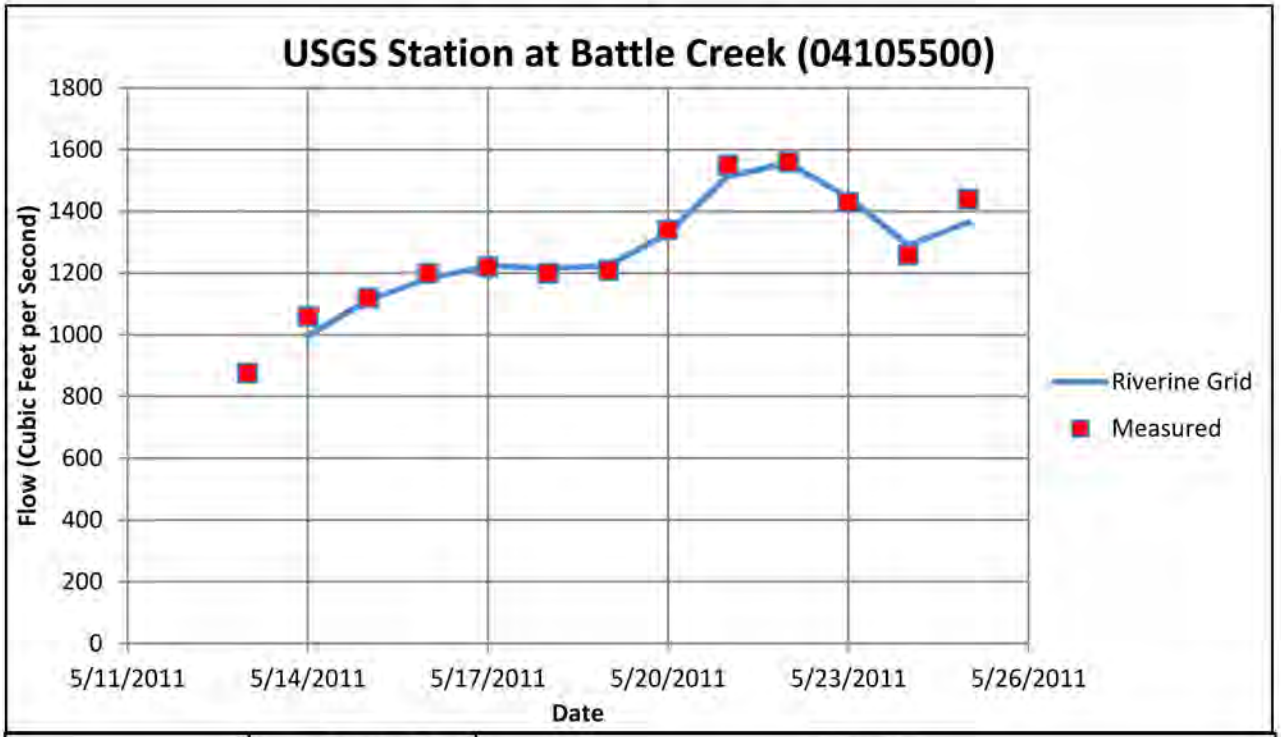
Figure 5-1

Riverine Flow Validation

Sheets 1 through 2



Date	Measured	Riverine		
	Flow (Cubic Feet per Second)	Flow (Cubic Feet per Second)	Difference (Cubic Feet per Second)	Difference (Percent)
5/13/2011	876	NA	NA	NA
5/14/2011	1060	996.0	-64.0	-6
5/15/2011	1120	1112.1	-7.9	-1
5/16/2011	1200	1181.6	-18.4	-2
5/17/2011	1220	1223.5	3.5	0
5/18/2011	1200	1216.1	16.1	1
5/19/2011	1210	1223.3	13.3	1
5/20/2011	1340	1329.2	-10.8	-1
5/21/2011	1550	1514.6	-35.4	-2
5/22/2011	1560	1556.1	-3.9	0
5/23/2011	1430	1446.2	16.2	1
5/24/2011	1260	1290.6	30.6	2
5/25/2011	1440	1364.4	-75.6	-5

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Drawn: JLH 04/17/2012

Approved: DBR 04/17/2012

Project #: 106-4186

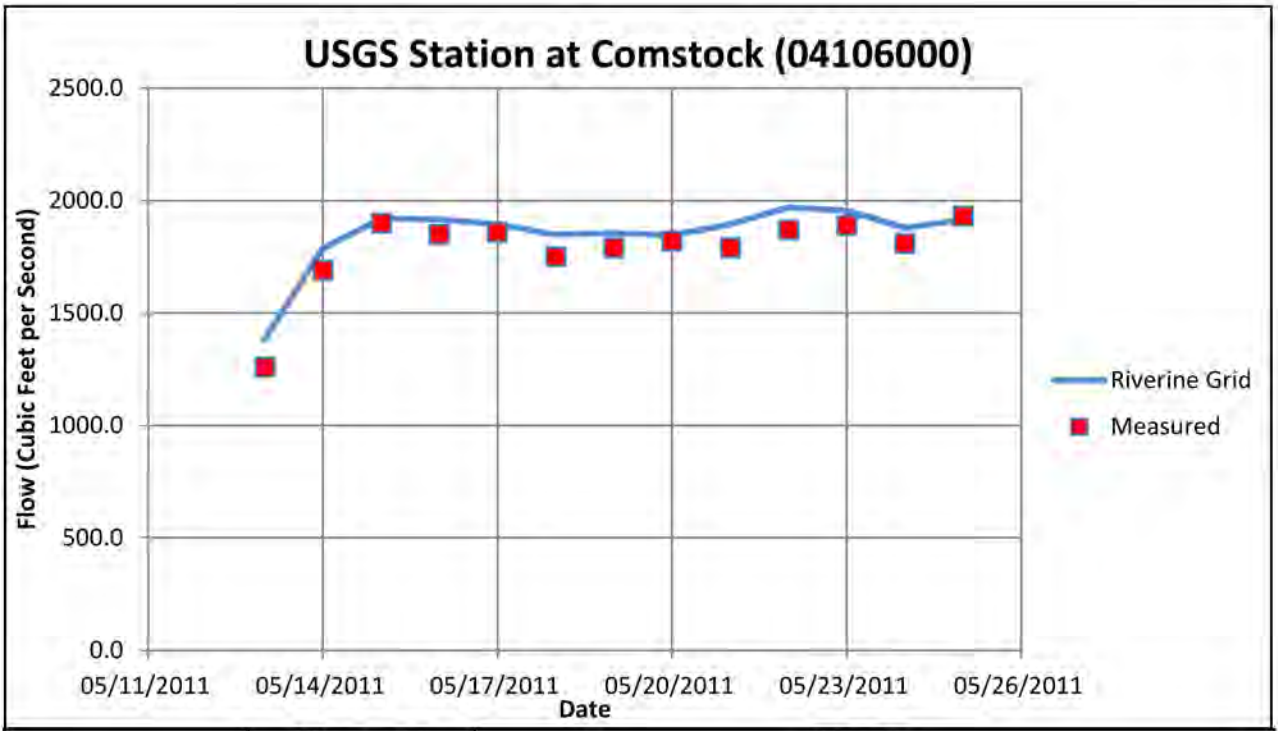
Footnotes:

NA = Not Available

RIVERINE FLOW VALIDATION

SHEET 1 OF 2

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP



Date	Measured	Riverine		
	Flow (Cubic Feet per Second)	Flow (Cubic Feet per Second)	Difference (Cubic Feet per Second)	Difference (Percent)
05/13/2011	1260	1383.3	123.3	10
05/14/2011	1690	1787.6	97.6	6
05/15/2011	1900	1919.2	19.2	1
05/16/2011	1850	1917.3	67.3	4
05/17/2011	1860	1893.4	33.4	2
05/18/2011	1750	1849.8	99.8	6
05/19/2011	1790	1854.8	64.8	4
05/20/2011	1820	1845.7	25.7	1
05/21/2011	1790	1894.8	104.8	6
05/22/2011	1870	1970.2	100.2	5
05/23/2011	1890	1955.9	65.9	3
05/24/2011	1810	1880.2	70.2	4
05/25/2011	1930	1914.3	-15.7	-1

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Drawn: JLH 04/17/2012

Approved: DBR 04/17/2012

Project #: 106-4186

Footnotes:

NA = Not Available

RIVERINE FLOW VALIDATION

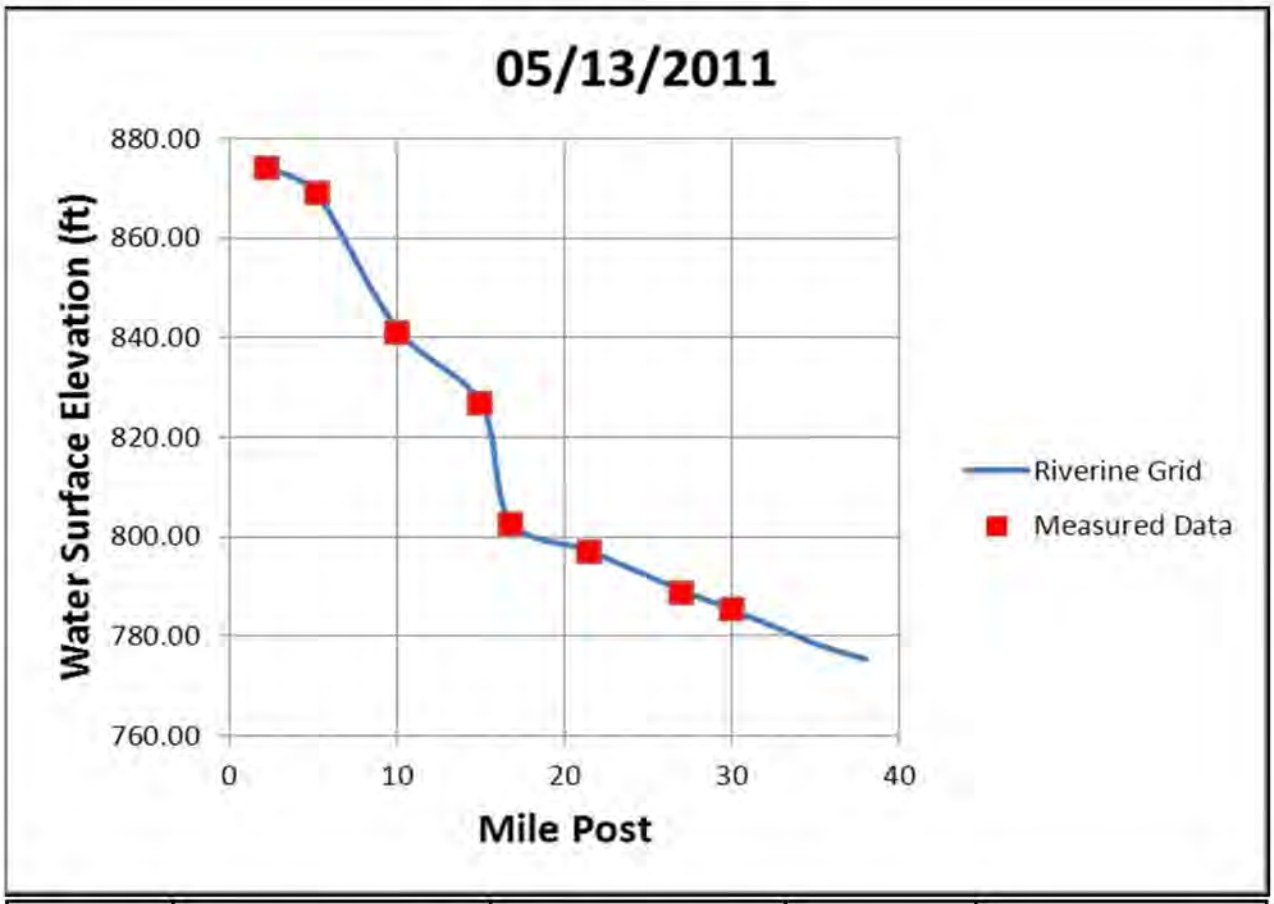
SHEET 2 OF 2

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP

Figure 5-2

Riverine Water Surface Elevation Validation

Sheets 1 through 9



Mile Post	Measured		Simulated	Difference (Feet)	Difference Normalized to Depth (Percent)
	Water Surface Elevation (Feet)	Depth (Feet)	Water Surface Elevation (Feet)		
2.25	874.1	5.23	874.3	0.10	2
5.25	869.1	4.89	868.7	-0.43	-9
10.00	840.9	3.37	841.8	0.94	28
15.00	826.8	3.95	826.9	0.07	2
16.75	802.6	3.7	803.3	0.65	18
21.50	797.0	3.62	797.1	0.09	3
27.00	788.8	5.41	789.2	0.42	8
30.00	785.3	5.56	785.4	0.10	2
35.00	NA	NA	778.5	NA	NA
38.00	NA	NA	775.4	NA	NA

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Drawn: JLH 04/17/2012

Approved: DBR 04/17/2012

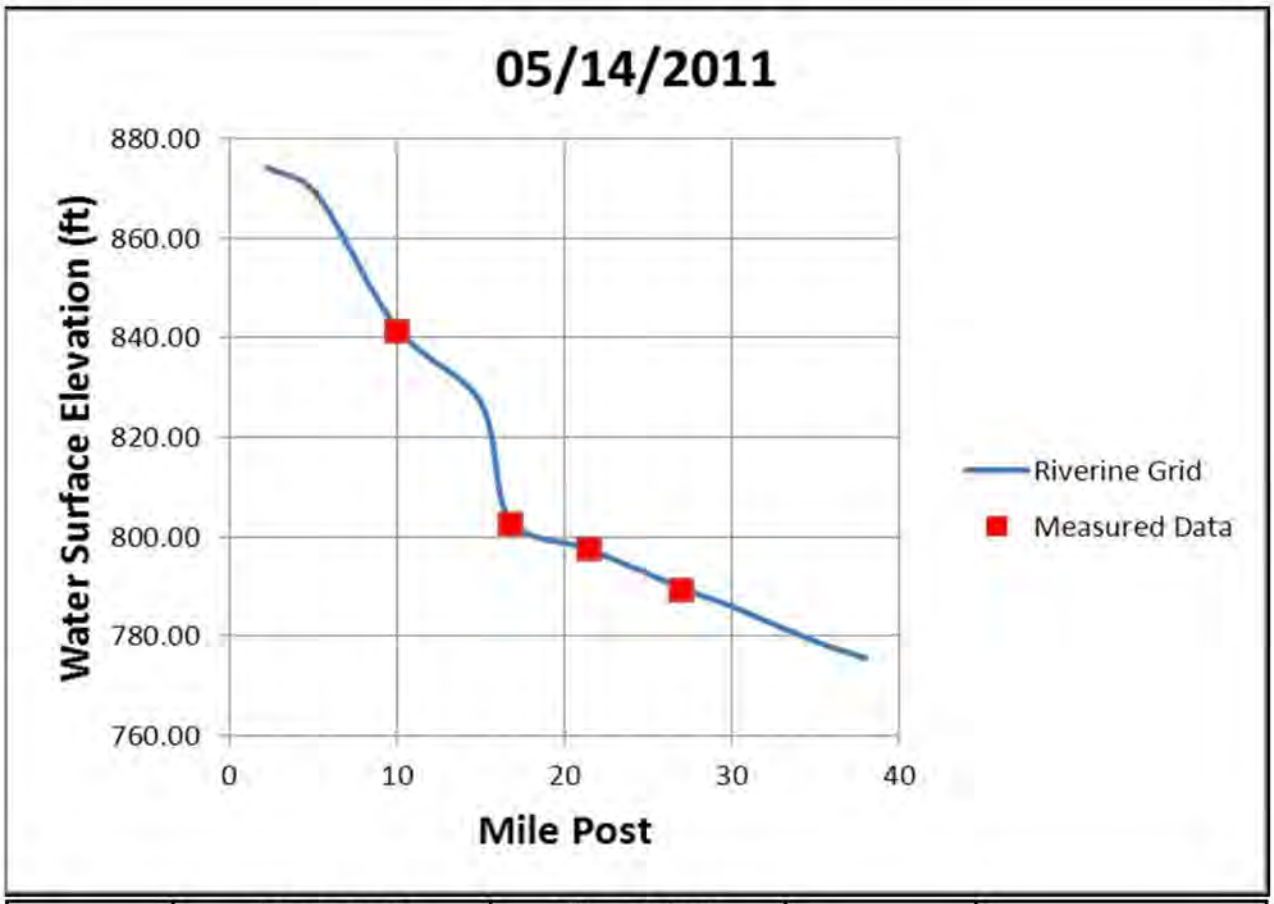
Project #: 106-4186

Footnotes:

ft = Feet
NA = Not Available

RIVERINE WATER SURFACE ELEVATION VALIDATION

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP



Mile Post	Measured		Simulated	Difference (Feet)	Difference Normalized to Depth (Percent)
	Water Surface Elevation (Feet)	Depth (Feet)	Water Surface Elevation (Feet)		
2.25	NA	5.23	874.25	NA	NA
5.25	NA	4.89	868.71	NA	NA
10.00	841.21	3.37	841.94	0.74	22
15.00	NA	3.95	826.95	NA	NA
16.75	802.66	3.74	803.40	0.74	20
21.50	797.51	3.62	797.43	-0.08	-2
27.00	789.31	5.41	789.73	0.41	8
30.00	NA	5.56	785.95	NA	NA
35.00	NA	NA	778.97	NA	NA
38.00	NA	NA	775.56	NA	NA

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Drawn: JLH 04/17/2012

Approved: DBR 04/17/2012

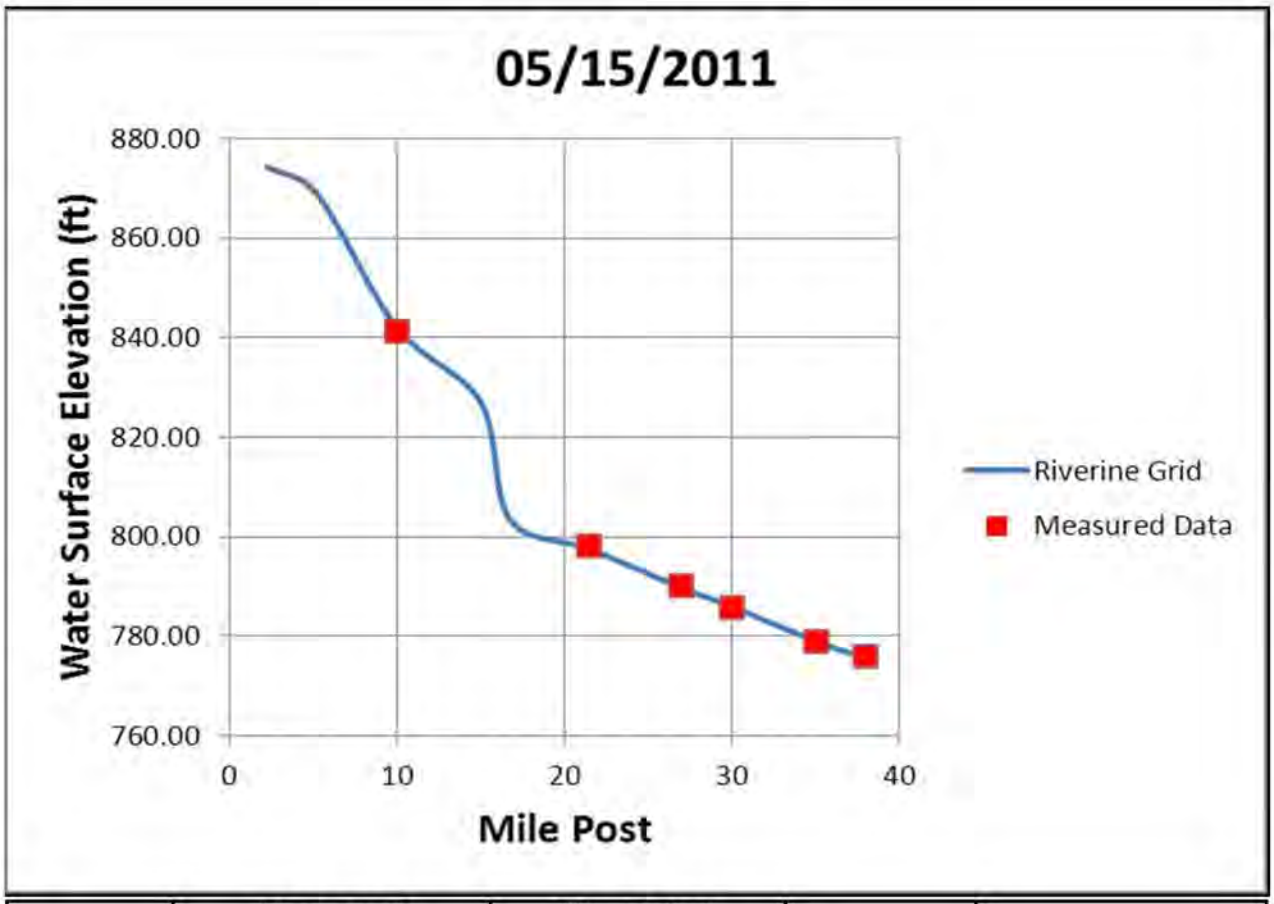
Project #: 106-4186

Footnotes:

ft = Feet
NA = Not Available

RIVERINE WATER SURFACE ELEVATION VALIDATION

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP



Mile Post	Measured		Simulated	Difference (Feet)	Difference Normalized to Depth (Percent)
	Water Surface Elevation (Feet)	Depth (Feet)	Water Surface Elevation (Feet)		
2.25	NA	NA	874.32	NA	NA
5.25	NA	NA	868.77	NA	NA
10.00	841.21	3.67	842.01	0.80	22
15.00	NA	NA	827.02	NA	NA
16.75	NA	NA	803.47	NA	NA
21.50	798.21	4.82	797.53	-0.68	-14
27.00	790.21	6.81	789.69	-0.52	-8
30.00	785.79	6.06	785.95	0.16	3
35.00	778.88	5.59	779.00	0.12	2
38.00	775.88	7.28	775.62	-0.26	-4

ENBRIDGE

Drawn: JLH 04/17/2012

Approved: DBR 04/17/2012

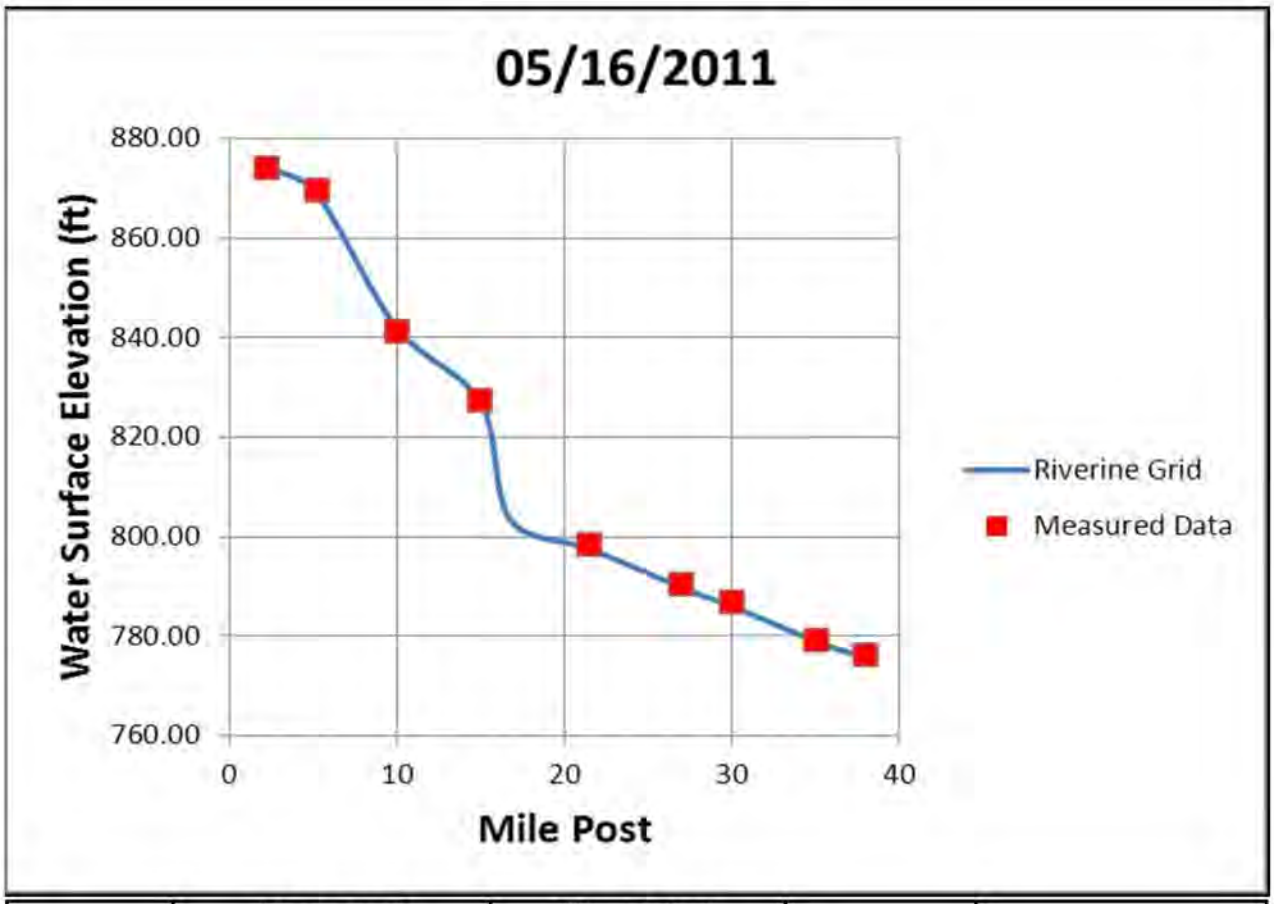
Project #: 106-4186

Footnotes:

ft = Feet
NA = Not Available

RIVERINE WATER SURFACE ELEVATION VALIDATION

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP



Mile Post	Measured		Simulated	Difference (Feet)	Difference Normalized to Depth (Percent)
	Water Surface Elevation (Feet)	Depth (Feet)	Water Surface Elevation (Feet)		
2.25	874.20	5.28	874.28	0.09	2
5.25	869.71	5.49	868.74	-0.96	-18
10.00	841.21	3.67	841.98	0.77	21
15.00	827.28	4.45	827.02	-0.26	-6
16.75	NA	NA	803.53	NA	NA
21.50	798.51	5.12	797.60	-0.91	-18
27.00	790.31	6.91	789.76	-0.55	-8
30.00	786.79	7.06	785.99	-0.81	-11
35.00	779.08	5.79	779.00	-0.08	-1
38.00	776.18	7.58	775.62	-0.56	-7

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Drawn: JLH 04/17/2012

Approved: DBR 04/17/2012

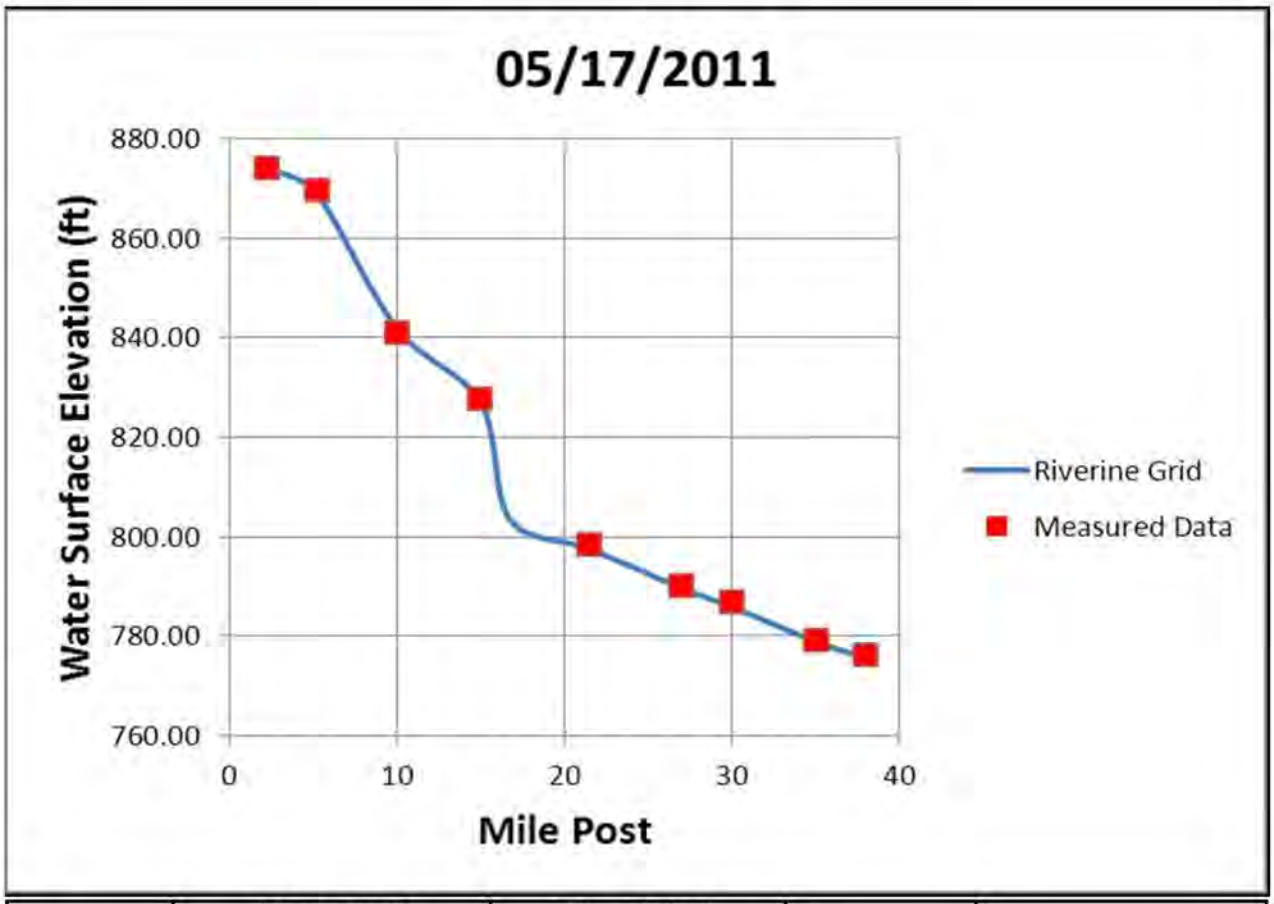
Project #: 106-4186

Footnotes:

ft = Feet
NA = Not Available

RIVERINE WATER SURFACE ELEVATION VALIDATION

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP



Mile Post	Measured		Simulated	Difference (Feet)	Difference Normalized to Depth (Percent)
	Water Surface Elevation (Feet)	Depth (Feet)	Water Surface Elevation (Feet)		
2.25	874.20	5.28	874.28	0.09	2
5.25	869.71	5.49	868.74	-0.96	-18
10.00	841.21	3.67	841.98	0.77	21
15.00	827.28	4.45	827.02	-0.26	-6
16.75	NA	NA	803.53	NA	NA
21.50	798.51	5.12	797.60	-0.91	-18
27.00	790.31	6.91	789.76	-0.55	-8
30.00	786.79	7.06	785.99	-0.81	-11
35.00	779.08	5.79	779.00	-0.08	-1
38.00	776.18	7.58	775.62	-0.56	-7

ENBRIDGE

Drawn: JLH 04/17/2012

Approved: DBR 04/17/2012

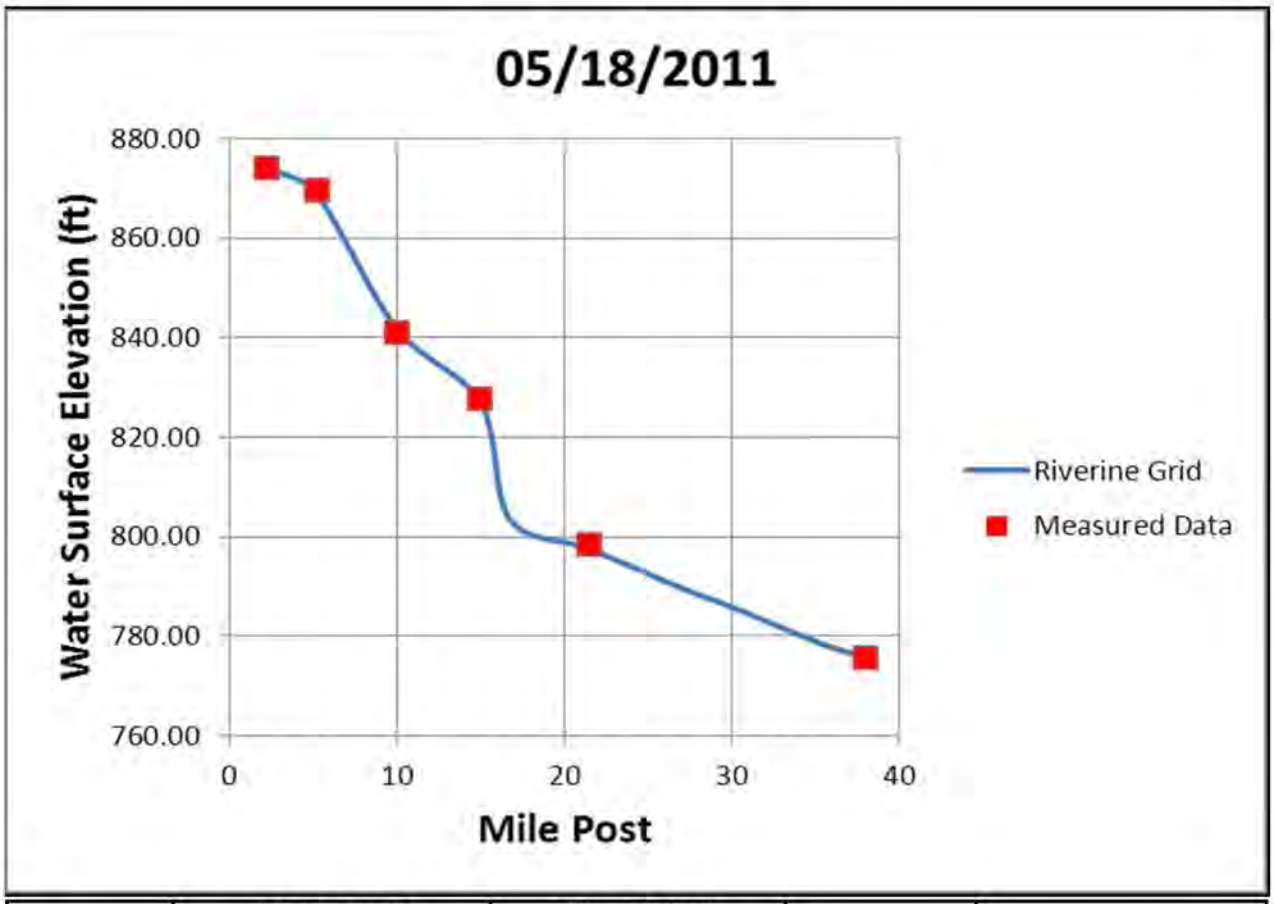
Project #: 106-4186

Footnotes:

ft = Feet
NA = Not Available

RIVERINE WATER SURFACE ELEVATION VALIDATION

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP



Mile Post	Measured		Simulated	Difference (Feet)	Difference Normalized to Depth (Percent)
	Water Surface Elevation (Feet)	Depth (Feet)	Water Surface Elevation (Feet)		
2.25	874.20	5.28	874.12	-0.08	-1
5.25	869.61	5.39	868.61	-1.00	-18
10.00	841.11	3.57	841.81	0.71	20
15.00	827.58	4.75	826.89	-0.70	-15
16.75	NA	NA	803.50	NA	NA
21.50	798.51	5.12	797.56	-0.95	-18
27.00	NA	NA	789.66	NA	NA
30.00	NA	NA	785.86	NA	NA
35.00	NA	NA	778.93	NA	NA
38.00	775.68	7.08	775.59	-0.09	-1

ENBRIDGE

Drawn: JLH 04/17/2012

Approved: DBR 04/17/2012

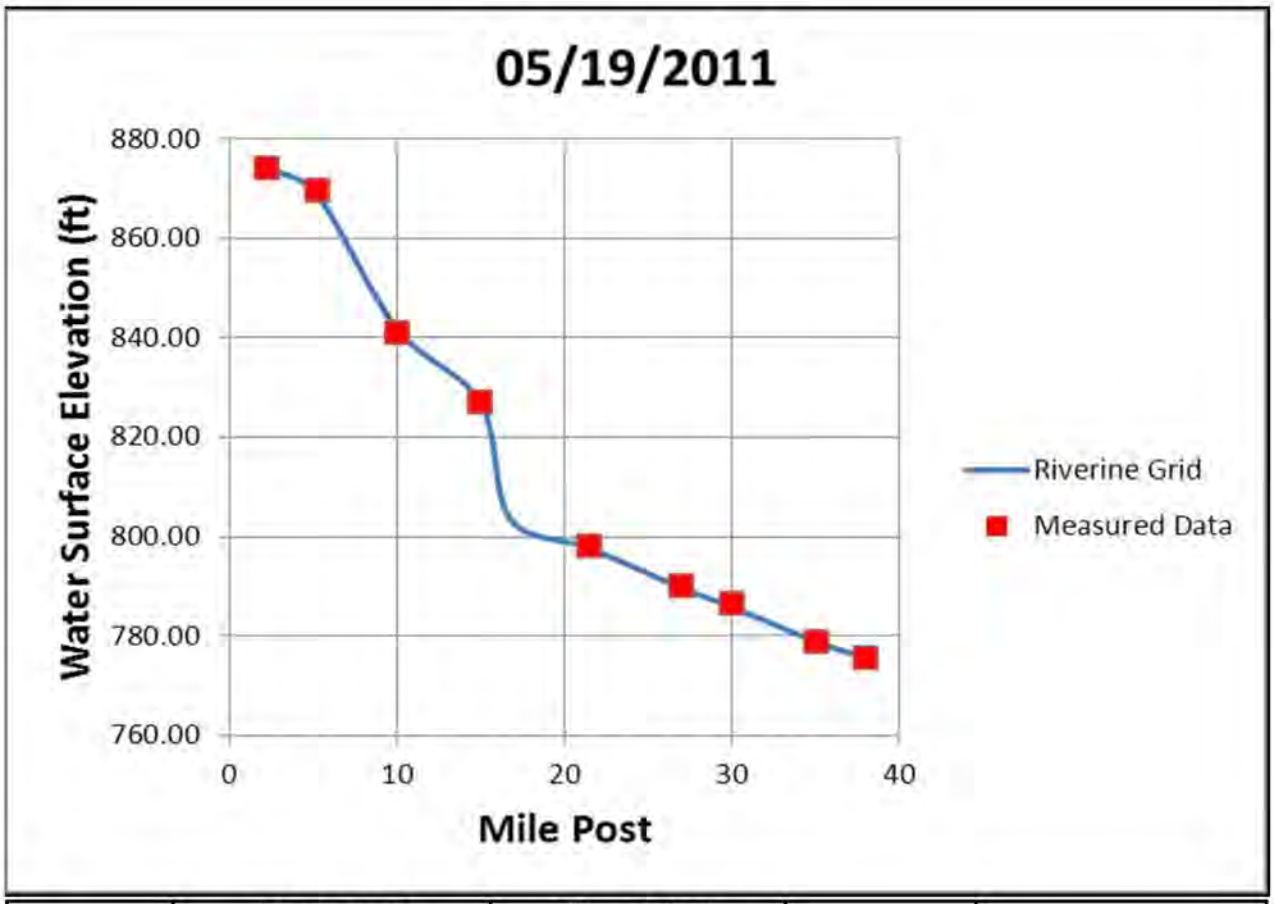
Project #: 106-4186

Footnotes:

ft = Feet
NA = Not Available

RIVERINE WATER SURFACE ELEVATION VALIDATION

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP



Mile Post	Measured		Simulated	Difference (Feet)	Difference Normalized to Depth (Percent)
	Water Surface Elevation (Feet)	Depth (Feet)	Water Surface Elevation (Feet)		
2.25	874.20	5.28	874.15	-0.04	-1
5.25	869.61	5.39	868.64	-0.96	-18
10.00	840.91	3.37	841.84	0.94	28
15.00	827.08	4.25	826.92	-0.16	-4
16.75	NA	NA	803.63	NA	NA
21.50	798.21	4.82	797.70	-0.52	-11
27.00	790.21	6.81	789.66	-0.55	-8
30.00	786.69	6.96	785.86	-0.84	-12
35.00	778.78	5.49	778.93	0.15	3
38.00	775.68	7.08	775.59	-0.09	-1

ENBRIDGE

Drawn: JLH 04/17/2012

Approved: DBR 04/17/2012

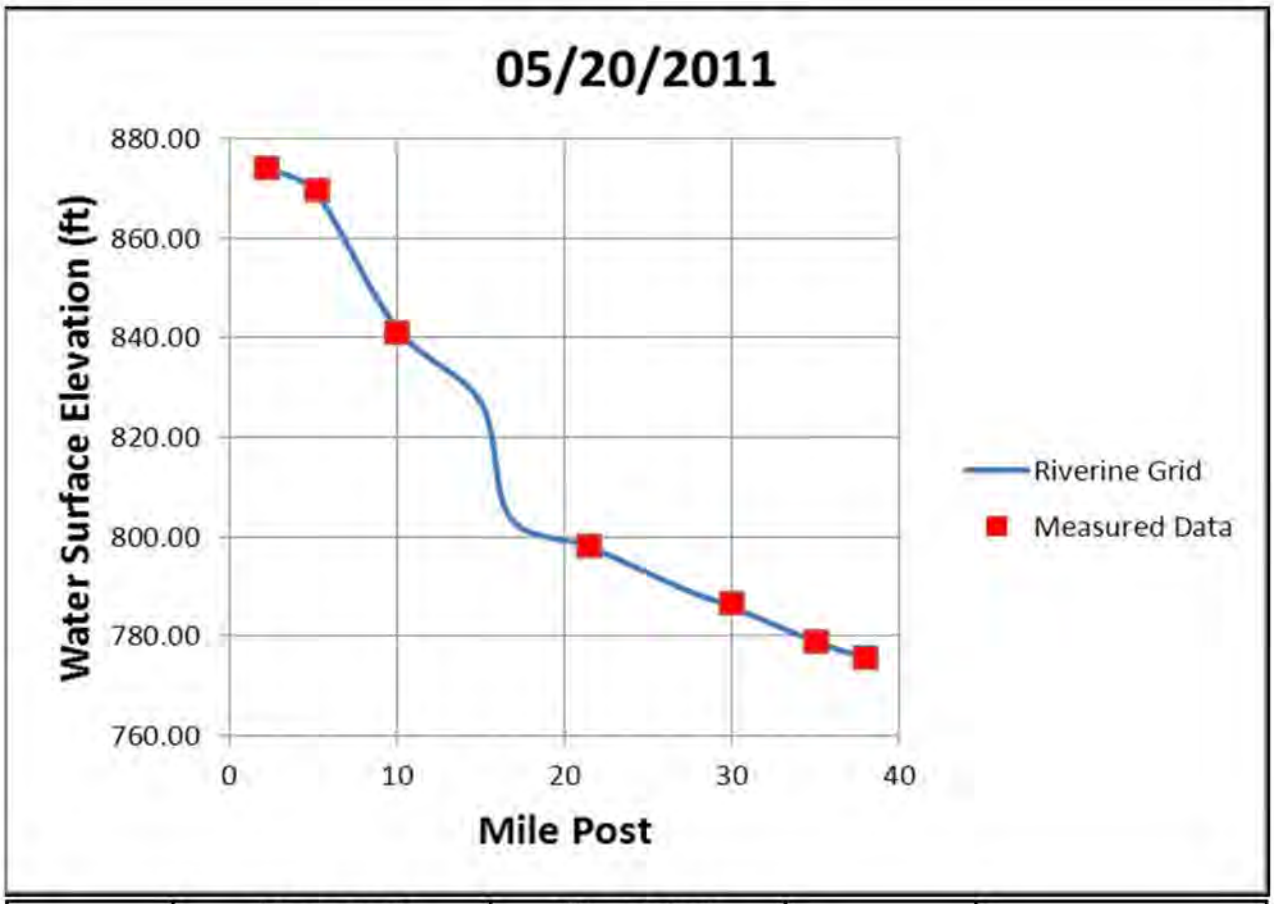
Project #: 106-4186

Footnotes:

ft = Feet
NA = Not Available

RIVERINE WATER SURFACE ELEVATION VALIDATION

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP



Mile Post	Measured		Simulated	Difference (Feet)	Difference Normalized to Depth (Percent)
	Water Surface Elevation (Feet)	Depth (Feet)	Water Surface Elevation (Feet)		
2.25	874.20	5.28	874.19	-0.01	0
5.25	869.71	5.49	868.68	-1.03	-19
10.00	840.91	3.37	841.88	0.97	29
15.00	NA	NA	826.99	NA	NA
16.75	NA	NA	803.90	NA	NA
21.50	798.01	4.62	797.96	-0.05	-1
27.00	NA	NA	789.66	NA	NA
30.00	786.49	6.76	785.86	-0.64	-9
35.00	778.78	5.49	778.90	0.12	2
38.00	775.68	7.08	775.59	-0.09	-1

ENBRIDGE

Drawn: JLH 04/17/2012

Approved: DBR 04/17/2012

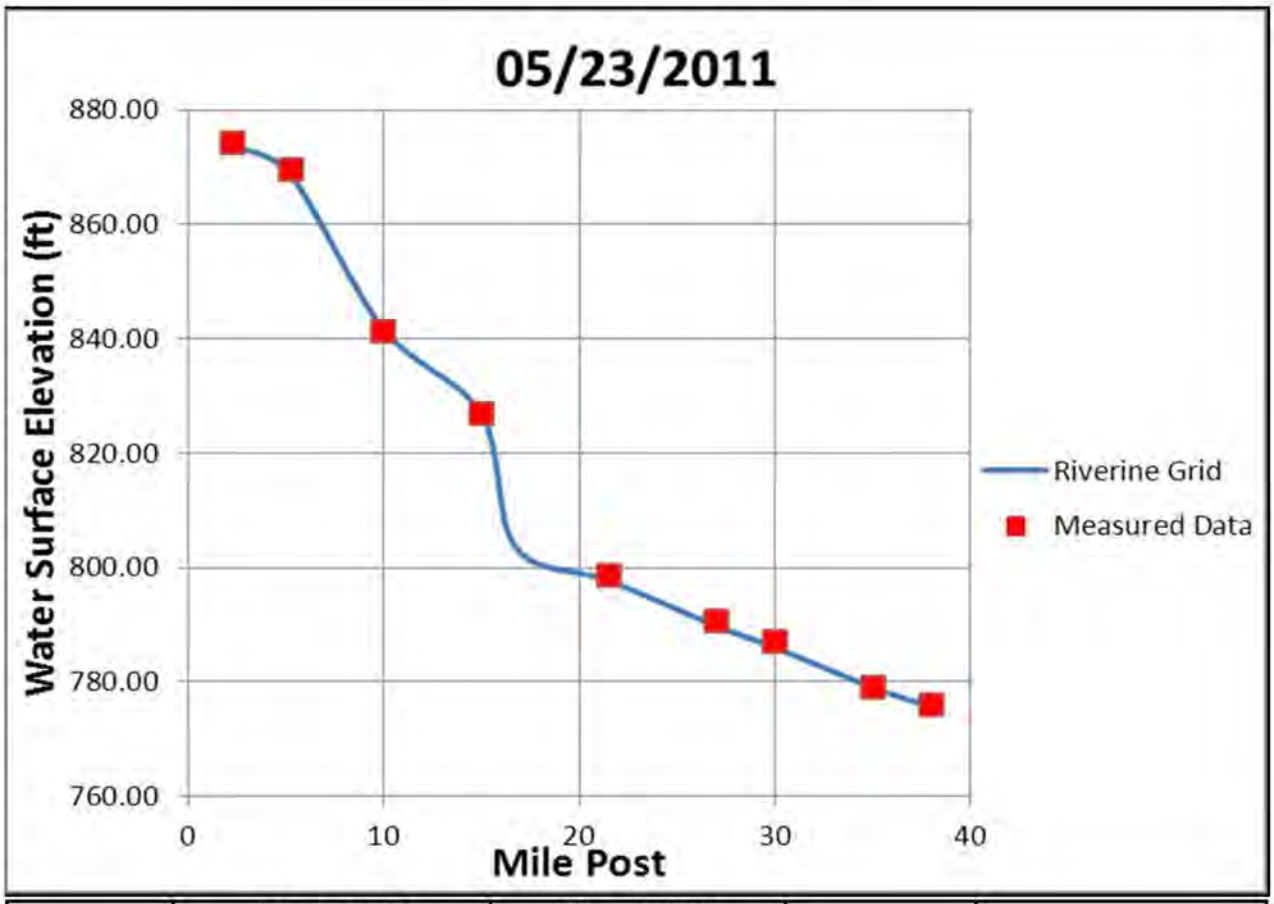
Project #: 106-4186

Footnotes:

ft = Feet
NA = Not Available

RIVERINE WATER SURFACE ELEVATION VALIDATION

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP



Mile Post	Measured		Simulated	Difference (Feet)	Difference Normalized to Depth (Percent)
	Water Surface Elevation (Feet)	Depth (Feet)	Water Surface Elevation (Feet)		
2.25	874.20	5.28	873.99	-0.21	-4
5.25	869.51	5.29	868.54	-0.96	-18
10.00	841.21	3.67	841.71	0.51	14
15.00	826.98	4.15	826.82	-0.16	-4
16.75	NA	NA	803.53	NA	NA
21.50	798.51	5.12	797.70	-0.82	-16
27.00	790.51	7.11	789.79	-0.72	-10
30.00	786.99	7.26	785.99	-1.01	-14
35.00	778.98	5.69	779.00	0.02	0
38.00	775.88	7.28	775.62	-0.26	NA

ENBRIDGE

Drawn: JLH 04/17/2012

Approved: DBR 04/17/2012

Project #: 106-4186

Footnotes:

ft = Feet
NA = Not Available

RIVERINE WATER SURFACE ELEVATION VALIDATION

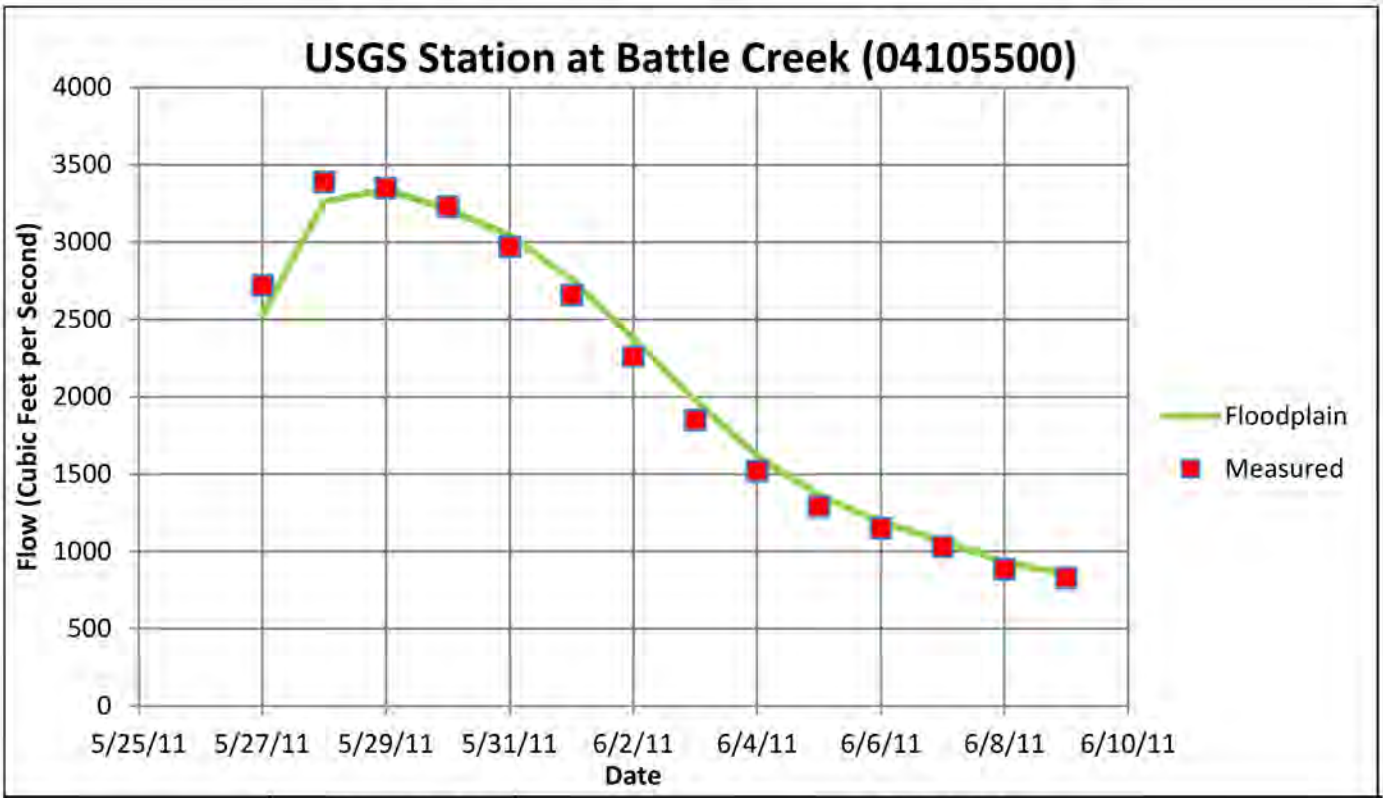
SHEET 9 OF 9

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP

Figure 5-3

Floodplain Flow Validation

Sheets 1 through 2



Date	Measured	Floodplain		
	Flow (Cubic Feet per Second)	Flow (Cubic Feet per Second)	Difference (Cubic Feet per Second)	Difference (Percent)
5/27/2011	2720	2531.5	-188.5	-7
5/28/2011	3390	3262.4	-127.6	-4
5/29/2011	3350	3341.3	-8.7	0
5/30/2011	3230	3215.0	-15.0	0
5/31/2011	2970	3043.2	73.2	2
6/1/2011	2660	2760.1	100.1	4
6/2/2011	2260	2375.0	115.0	5
6/3/2011	1850	1978.2	128.2	7
6/4/2011	1520	1617.3	97.3	6
6/5/2011	1290	1361.4	71.4	6
6/6/2011	1150	1194.7	44.7	4
6/7/2011	1030	1066.8	36.8	4
6/8/2011	885	931.1	46.1	5
6/9/2011	827	851.7	24.7	3

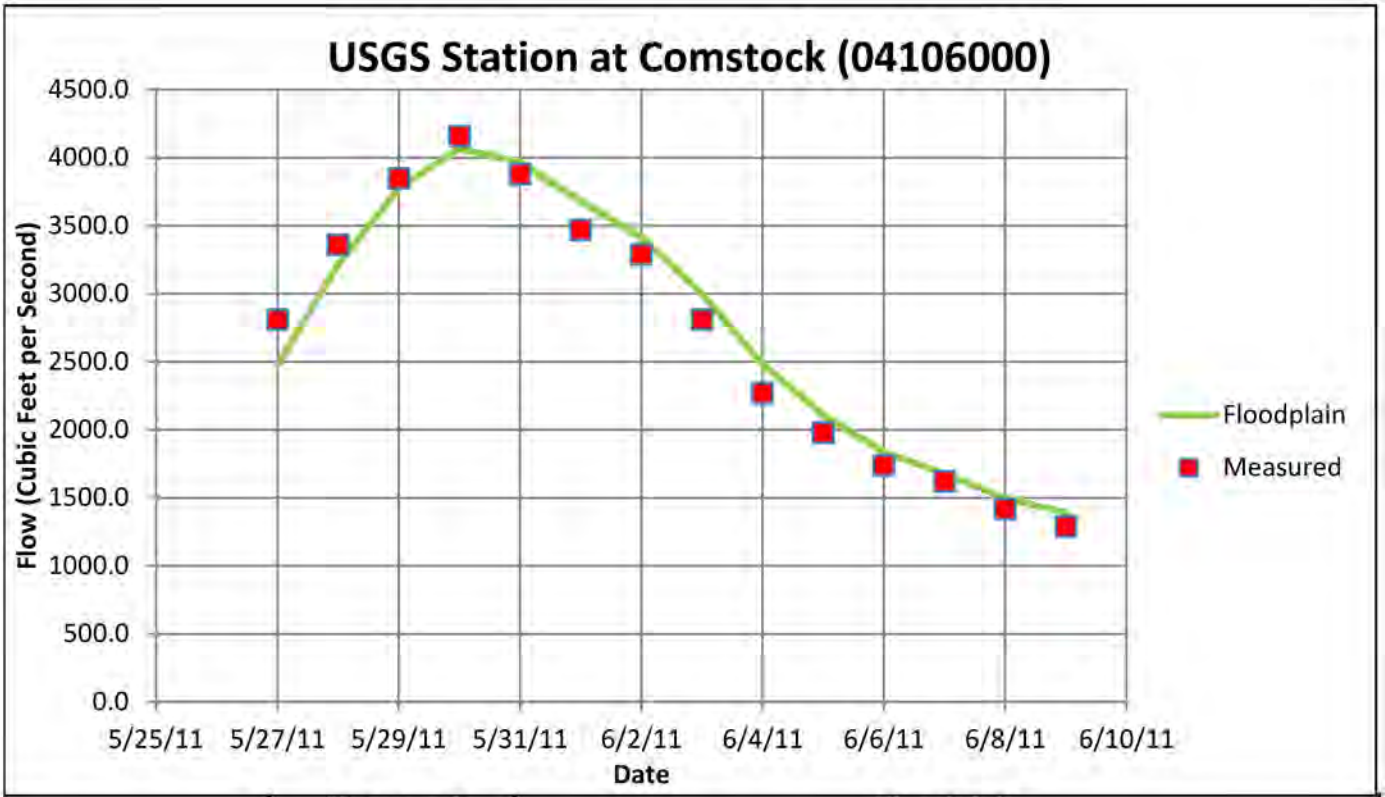
ENBRIDGE

Drawn:	MB	4/17/2012
Approved:	CM	4/17/2012
Project #:	106-4186	

FLOODPLAIN FLOW VALIDATION

SHEET 1 OF 2

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP



Date	Measured	Floodplain		
	Flow (Cubic Feet per Second)	Flow (Cubic Feet per Second)	Difference (Cubic Feet per Second)	Difference (Percent)
5/27/2011	2810	2476.3	-333.7	-12
5/28/2011	3360	3216.6	-143.4	-4
5/29/2011	3850	3774.5	-75.5	-2
5/30/2011	4160	4065.8	-94.2	-2
5/31/2011	3880	3968.3	88.3	2
6/1/2011	3470	3680.3	210.3	6
6/2/2011	3290	3414.7	124.7	4
6/3/2011	2810	2994.6	184.6	7
6/4/2011	2270	2484.5	214.5	9
6/5/2011	1980	2104.5	124.5	6
6/6/2011	1740	1835.0	95.0	5
6/7/2011	1620	1676.1	56.1	3
6/8/2011	1420	1496.8	76.8	5
6/9/2011	1290	1392.4	102.4	8

ENBRIDGE

Drawn: MB 4/17/2012

Approved: CM 4/17/2012

Project #: 106-4186

FLOODPLAIN FLOW VALIDATION

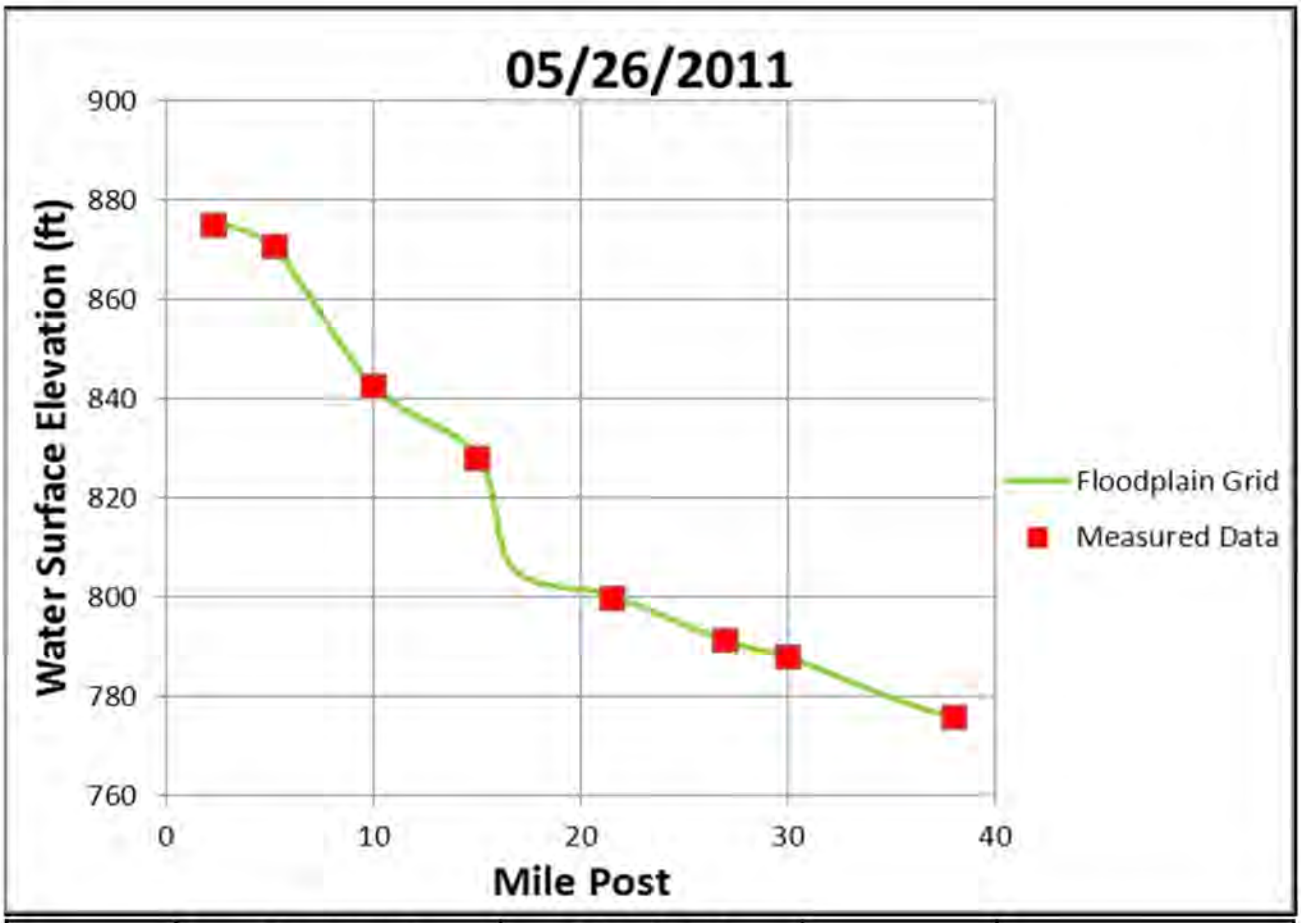
SHEET 2 OF 2

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP

Figure 5-4

Floodplain Water Surface Elevation Validation

Sheets 1 through 9



Mile Post	Measured		Simulated	Difference (ft)	Difference Normalized to Depth (%)
	Water Surface Elevation (ft)	Depth (ft)	Water Surface Elevation (ft)		
2.25	874.80	5.88	875.69	0.90	15
5.25	870.61	6.39	869.99	-0.62	-10
10.00	842.61	5.07	842.44	-0.17	-3
15.00	828.08	5.25	828.59	0.51	10
16.75	NA	5.25	805.70	NA	NA
21.50	799.91	6.52	800.32	0.41	6
27.00	791.41	8.01	791.17	-0.24	-3
30.00	788.09	8.36	787.99	-0.10	-1
35.00	NA	NA	779.75	NA	NA
38.00	775.98	7.38	775.69	-0.29	-4

ENBRIDGE

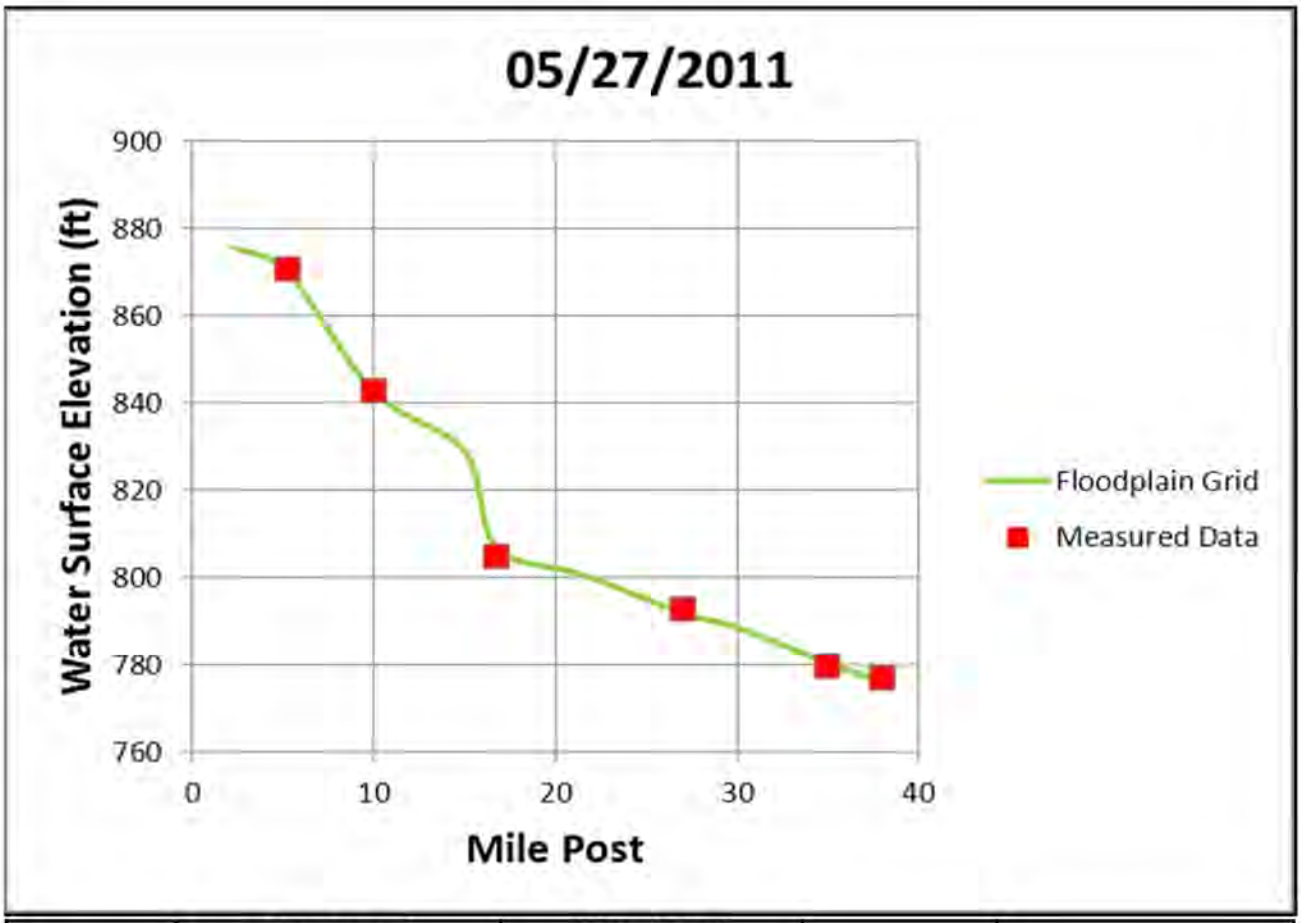
Drawn:	MB	4/17/2012
Approved:	CM	4/17/2012
Project #:	106-4186	

Footnotes:
ft=Feet
%=Percent
NA=Not Available

FLOODPLAIN WATER SURFACE ELEVATION VALIDATION

SHEET 1 OF 9

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP



Mile Post	Measured		Simulated	Difference (ft)	Difference Normalized to Depth (%)
	Water Surface Elevation (ft)	Depth (ft)	Water Surface Elevation (ft)		
2.25	NA	NA	875.73	NA	NA
5.25	870.81	6.59	870.05	-0.75	-11
10.00	842.91	5.37	842.53	-0.37	-7
15.00	NA	NA	828.89	NA	NA
16.75	804.94	5.81	806.88	1.94	33
21.50	NA	NA	800.65	NA	NA
27.00	792.81	9.41	791.86	-0.95	-10
30.00	NA	0.00	788.51	NA	NA
35.00	779.78	6.49	780.41	0.63	10
38.00	776.98	8.38	775.92	-1.07	-13

ENBRIDGE

Drawn: MB 4/17/2012

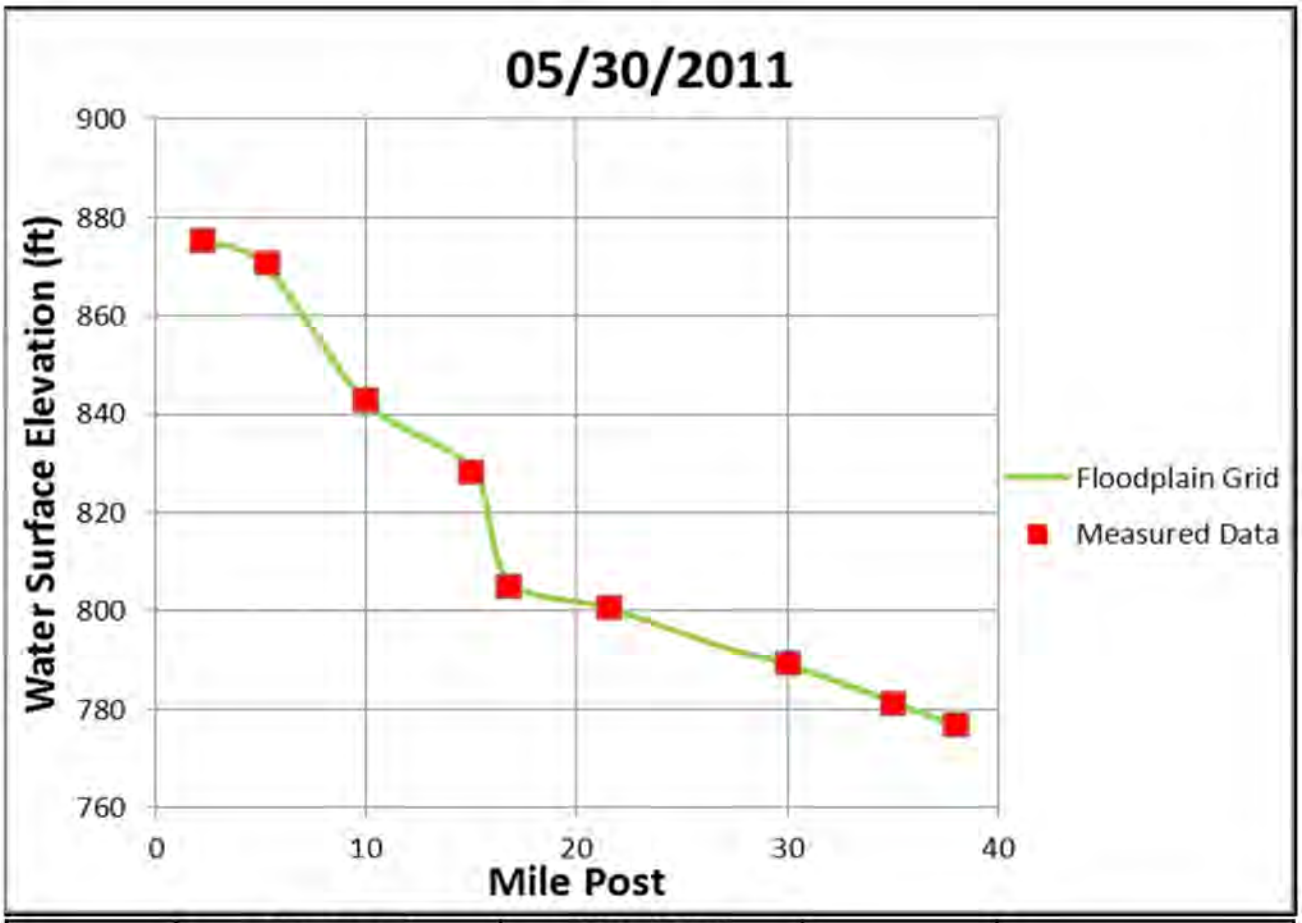
Approved: CM 4/17/2012

Project #: 106-4186

Footnotes:
ft=Feet
%=Percent
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FLOODPLAIN WATER SURFACE ELEVATION VALIDATION

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP



Mile Post	Measured		Simulated	Difference (ft)	Difference Normalized to Depth (%)
	Water Surface Elevation (ft)	Depth (ft)	Water Surface Elevation (ft)		
2.25	875.20	6.28	875.63	0.43	7
5.25	870.81	6.59	869.95	-0.85	-13
10.00	842.91	5.37	842.47	-0.44	-8
15.00	828.38	5.55	828.82	0.44	8
16.75	805.16	6.03	806.42	1.26	21
21.50	800.61	7.22	800.65	0.04	1
27.00	NA	NA	792.68	NA	NA
30.00	789.39	9.66	789.20	-0.19	-2
35.00	781.08	7.79	781.62	0.54	7
38.00	776.98	8.38	776.64	-0.34	-4

ENBRIDGE

Drawn: MB 4/17/2012

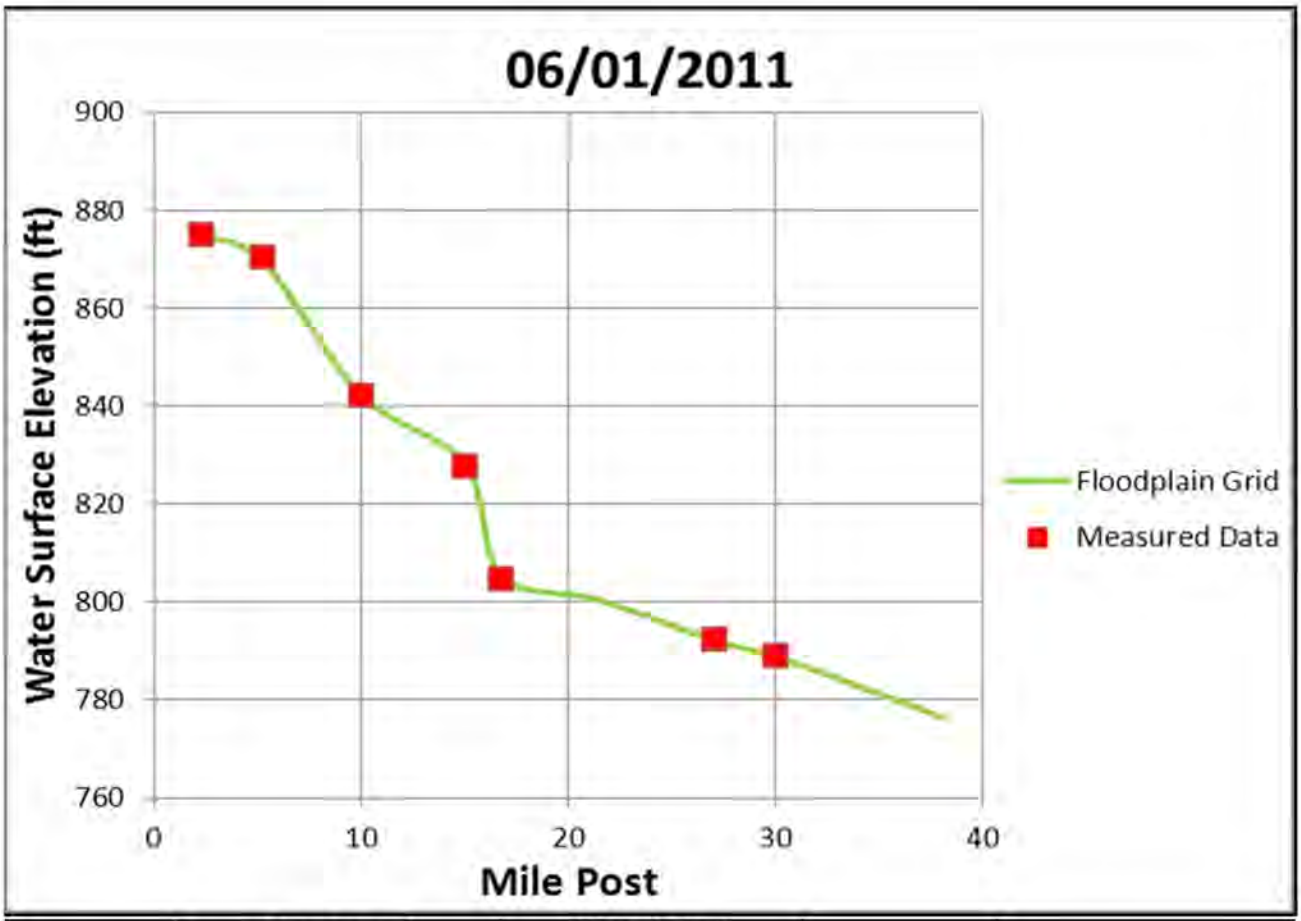
Approved: CM 4/17/2012

Project #: 106-4186

Footnotes:
ft=Feet
%=Percent
NA=Not Available

FLOODPLAIN WATER SURFACE ELEVATION VALIDATION

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP



Mile Post	Measured		Simulated	Difference (ft)	Difference Normalized to Depth (%)
	Water Surface Elevation (ft)	Depth (ft)	Water Surface Elevation (ft)		
2.25	875.00	6.08	875.17	0.17	3
5.25	870.41	6.19	869.53	-0.88	-14
10.00	842.01	4.47	842.21	0.20	4
15.00	827.78	4.95	828.27	0.48	10
16.75	804.60	5.47	805.40	0.81	15
21.50	NA	NA	800.35	NA	NA
27.00	792.41	9.01	792.19	-0.23	-3
30.00	789.09	9.36	788.81	-0.28	-3
35.00	NA	NA	781.23	NA	NA
38.00	NA	NA	776.47	NA	NA

ENBRIDGE

Drawn: MB 4/17/2012

Approved: CM 4/17/2012

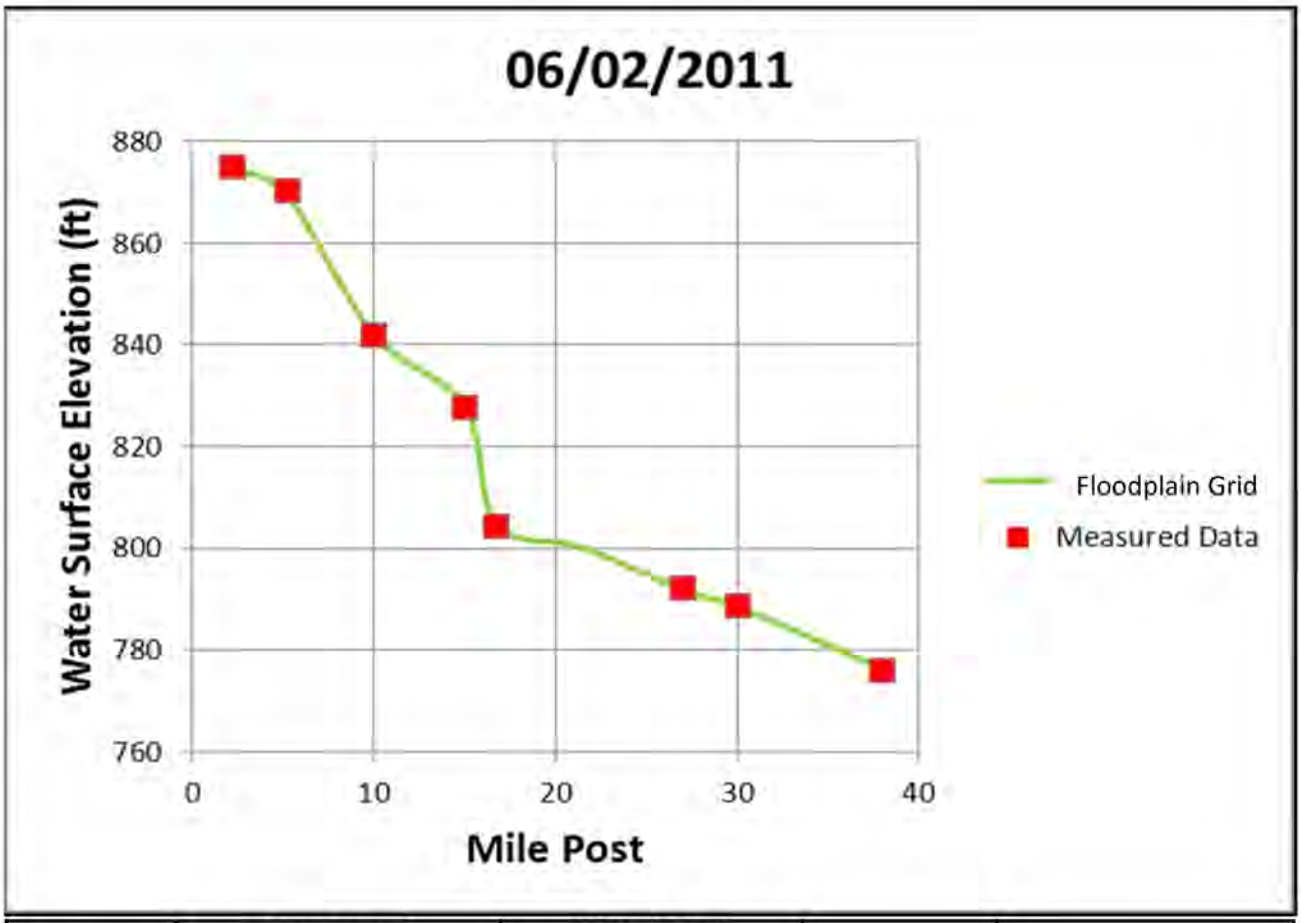
Project #: 106-4186

Footnotes:
ft=Feet
%=Percent
NA=Not Available

FLOODPLAIN WATER SURFACE ELEVATION VALIDATION

SHEET 4 OF 9

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP



Mile Post	Measured		Simulated	Difference (ft)	Difference Normalized to Depth (%)
	Water Surface Elevation (ft)	Depth (ft)	Water Surface Elevation (ft)		
2.25	874.90	5.98	874.91	0.01	0
5.25	870.21	5.99	869.30	-0.91	-15
10.00	841.91	4.37	842.04	0.14	3
15.00	827.78	4.95	827.97	0.19	4
16.75	804.22	5.09	804.72	0.50	10
21.50	NA	NA	800.16	NA	NA
27.00	792.31	8.91	791.82	-0.49	-5
30.00	788.59	8.86	788.58	-0.01	0
35.00	NA	NA	780.97	NA	NA
38.00	775.98	7.38	776.34	0.36	5

ENBRIDGE

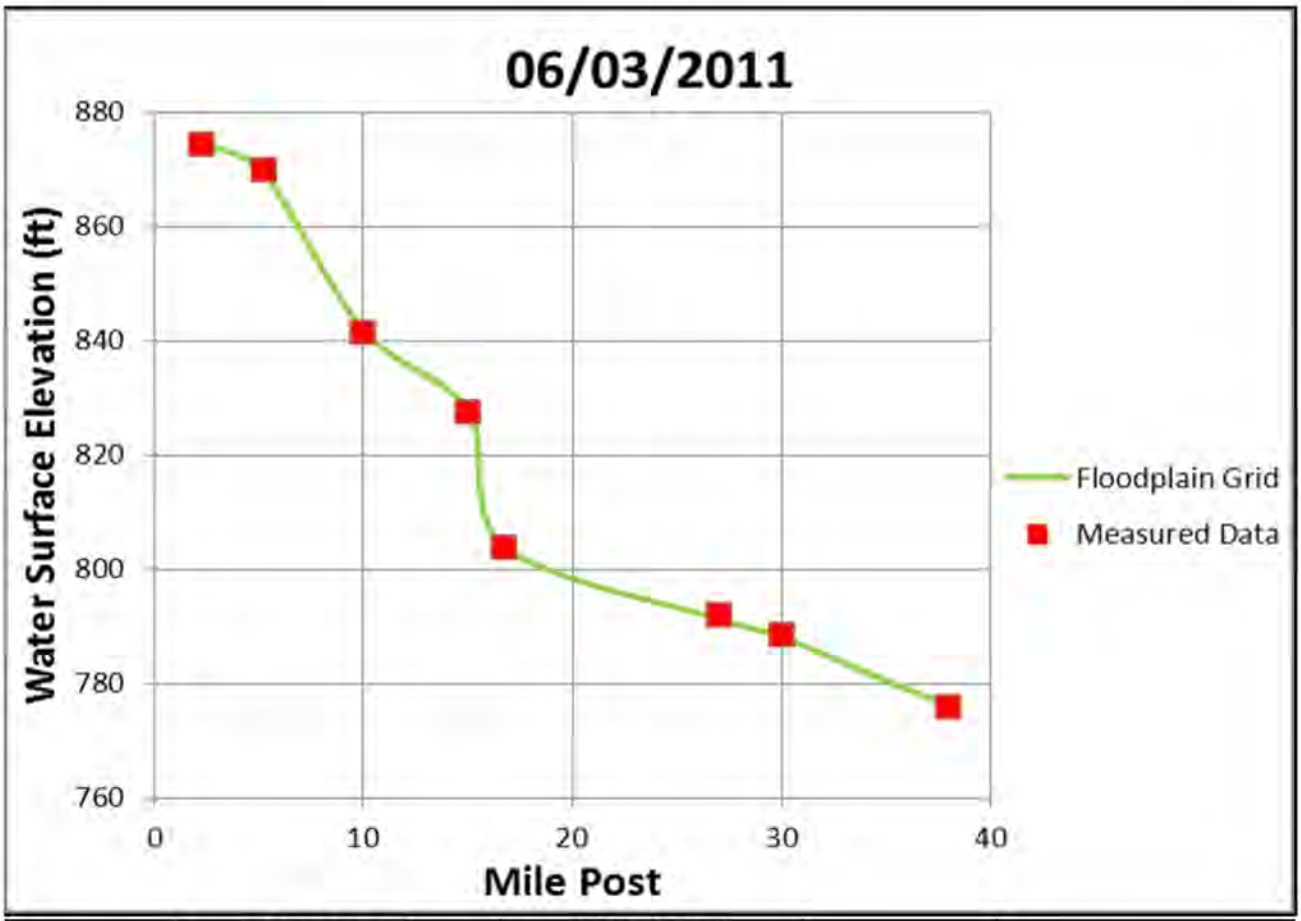
Drawn:	MB	4/17/2012
Approved:	CM	4/17/2012
Project #:	106-4186	

Footnotes:
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%=Percent
NA=Not Available

FLOODPLAIN WATER SURFACE ELEVATION VALIDATION

SHEET 5 OF 9

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP



Mile Post	Measured		Simulated	Difference (ft)	Difference Normalized to Depth (%)
	Water Surface Elevation (ft)	Depth (ft)	Water Surface Elevation (ft)		
2.25	874.50	5.58	874.61	0.11	2
5.25	869.81	5.59	869.07	-0.74	-13
10.00	841.61	4.07	841.88	0.27	7
15.00	827.58	4.75	827.74	0.16	3
16.75	803.86	4.73	803.99	0.14	3
27.00	792.11	8.71	791.30	-0.81	-9
30.00	788.49	8.76	788.18	-0.31	-4
35.00	NA	NA	780.51	NA	NA
38.00	775.88	7.28	776.15	0.26	4

ENBRIDGE

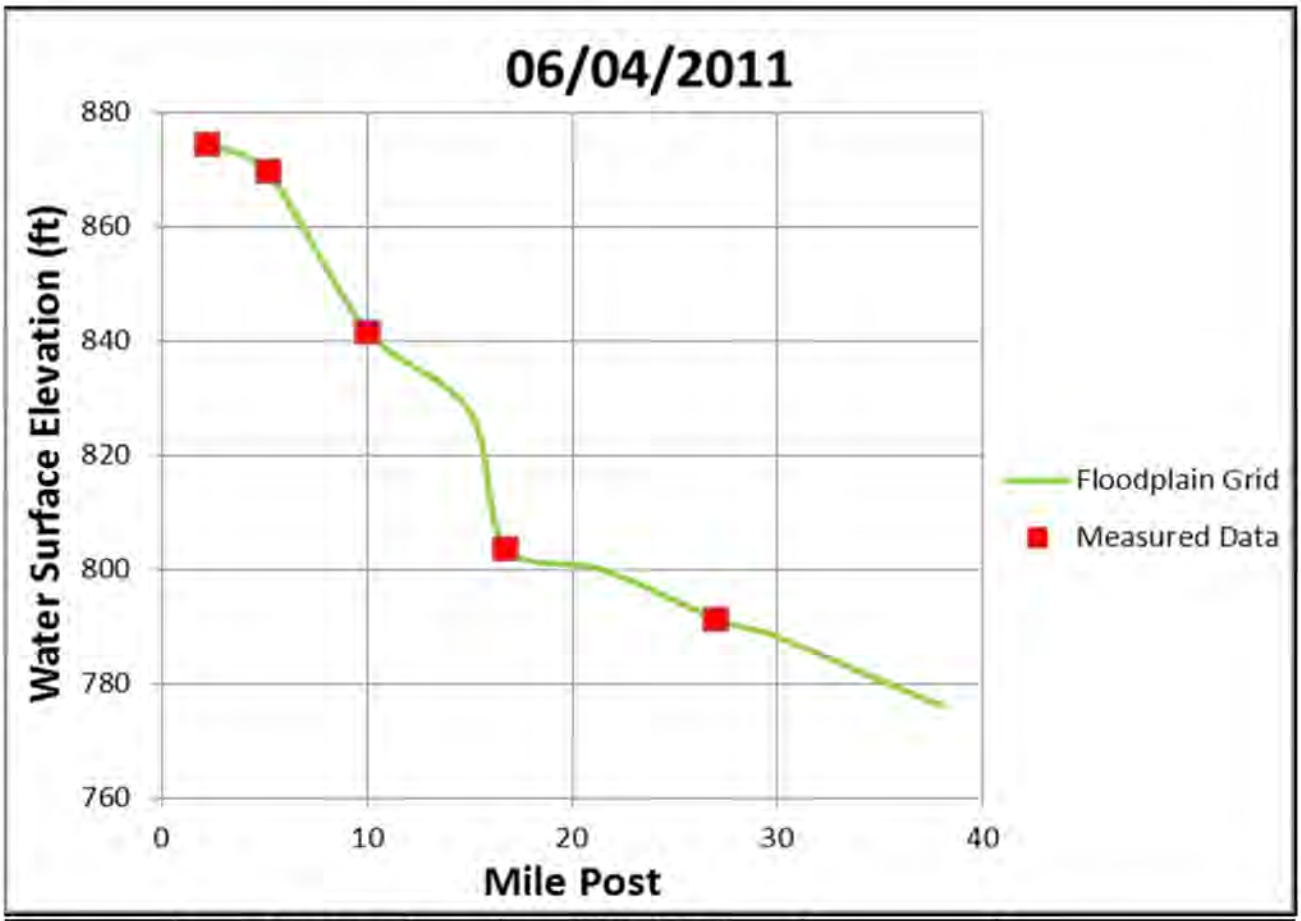
Drawn:	MB	4/17/2012
Approved:	CM	4/17/2012
Project #:	106-4186	

Footnotes:
ft=Feet
%=Percent
NA=Not Available

FLOODPLAIN WATER SURFACE ELEVATION VALIDATION

SHEET 6 OF 9

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP



Mile Post	Measured		Simulated	Difference (ft)	Difference Normalized to Depth (%)
	Water Surface Elevation (ft)	Depth (ft)	Water Surface Elevation (ft)		
2.25	874.30	5.38	874.61	0.31	6
5.25	869.71	5.49	869.07	-0.64	-12
10.00	841.61	4.07	841.88	0.27	7
15.00	NA	0.00	827.74	NA	NA
16.75	803.54	4.41	803.99	0.45	10
21.50	NA	NA	799.93	NA	NA
27.00	791.11	7.71	791.30	0.19	2
30.00	NA	NA	788.18	NA	NA
35.00	NA	NA	780.51	NA	NA
38.00	NA	NA	776.15	NA	NA

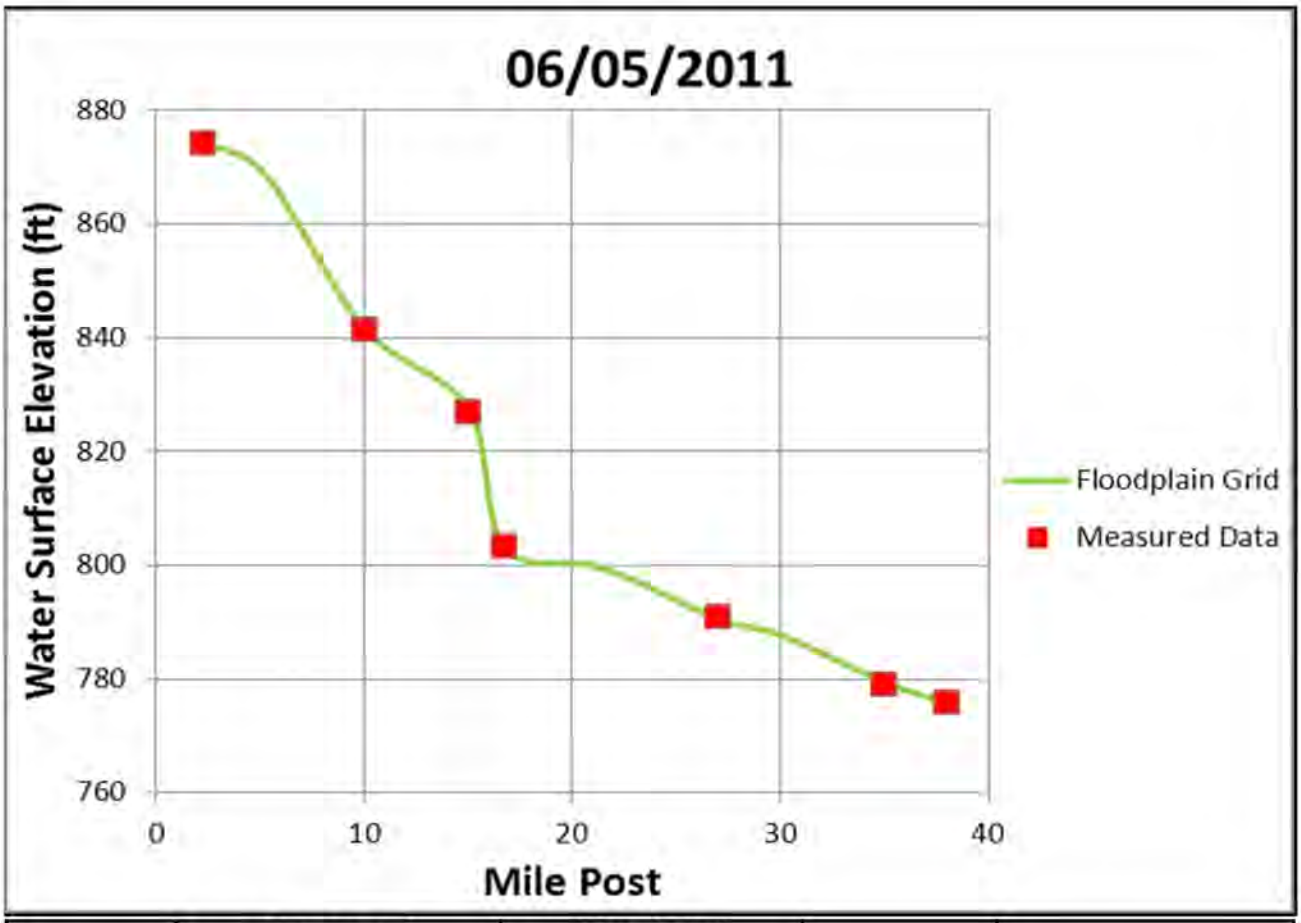
ENBRIDGE

Drawn:	MB	4/17/2012
Approved:	CM	4/17/2012
Project #:	106-4186	

Footnotes:
ft=Feet
%=Percent
NA=Not Available

FLOODPLAIN WATER SURFACE ELEVATION VALIDATION

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP



Mile Post	Measured		Simulated	Difference (ft)	Difference Normalized to Depth (%)
	Water Surface Elevation (ft)	Depth (ft)	Water Surface Elevation (ft)		
2.25	874.30	5.38	874.32	0.02	0
5.25	NA	NA	868.81	NA	NA
10.00	841.41	3.87	841.68	0.27	7
15.00	826.98	4.15	827.74	0.76	18
16.75	803.32	4.19	803.14	-0.18	-4
21.50	NA	NA	799.47	NA	NA
27.00	790.91	7.51	790.64	-0.27	-4
30.00	NA	NA	787.76	NA	NA
35.00	779.08	5.79	779.56	0.47	8
38.00	775.88	7.28	775.72	-0.16	-2

ENBRIDGE

Drawn:	MB	4/17/2012
Approved:	CM	4/17/2012
Project #:	106-4186	

Footnotes:
ft=Feet
%=Percent
NA=Not Available

FLOODPLAIN WATER SURFACE ELEVATION VALIDATION

SHEET 8 OF 9

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP



Mile Post	Measured		Simulated	Difference (ft)	Difference Normalized to Depth (%)
	Water Surface Elevation (ft)	Depth (ft)	Water Surface Elevation (ft)		
2.25	NA	NA	874.32	NA	NA
5.25	869.61	5.39	868.81	-0.80	-15
10.00	841.01	3.47	841.68	0.67	19
15.00	NA	NA	827.74	NA	NA
16.75	803.16	4.03	803.14	-0.02	0
21.50	798.21	4.82	799.47	1.26	26
27.00	NA	NA	790.64	NA	NA
30.00	786.59	6.86	787.76	1.17	17
35.00	NA	NA	779.56	NA	NA
38.00	775.88	7.28	775.72	-0.16	-2

ENBRIDGE

Drawn:	MB	4/17/2012
Approved:	CM	4/17/2012
Project #:	106-4186	

Footnotes:
ft=Feet
%=Percent
NA=Not Available

FLOODPLAIN WATER SURFACE ELEVATION VALIDATION

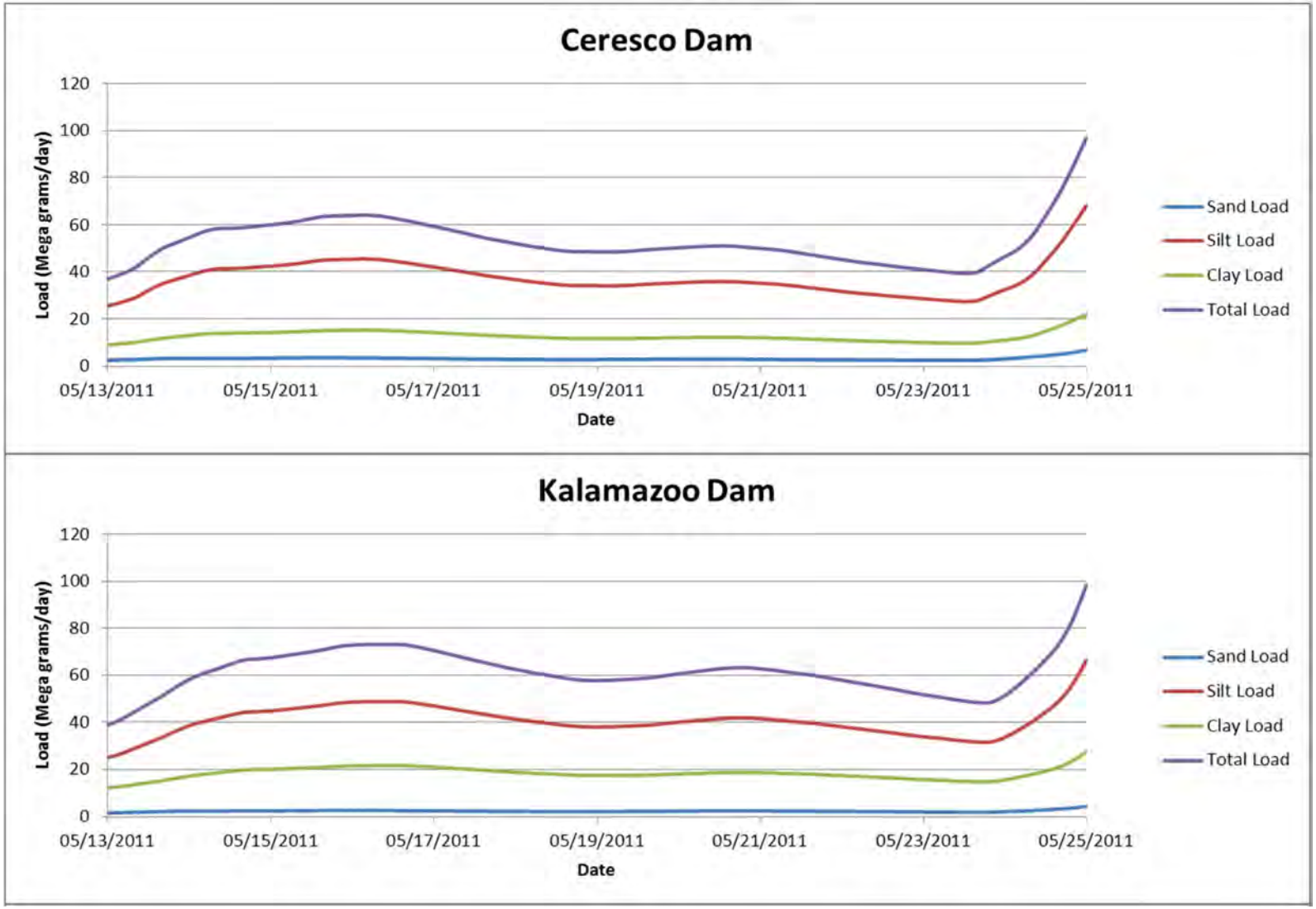
SHEET 9 OF 9

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP

Figure 5-5

Riverine Simulated Sediment Mass Flux (Megagrams per Day) in Kalamazoo River Validation

Sheets 1 through 6



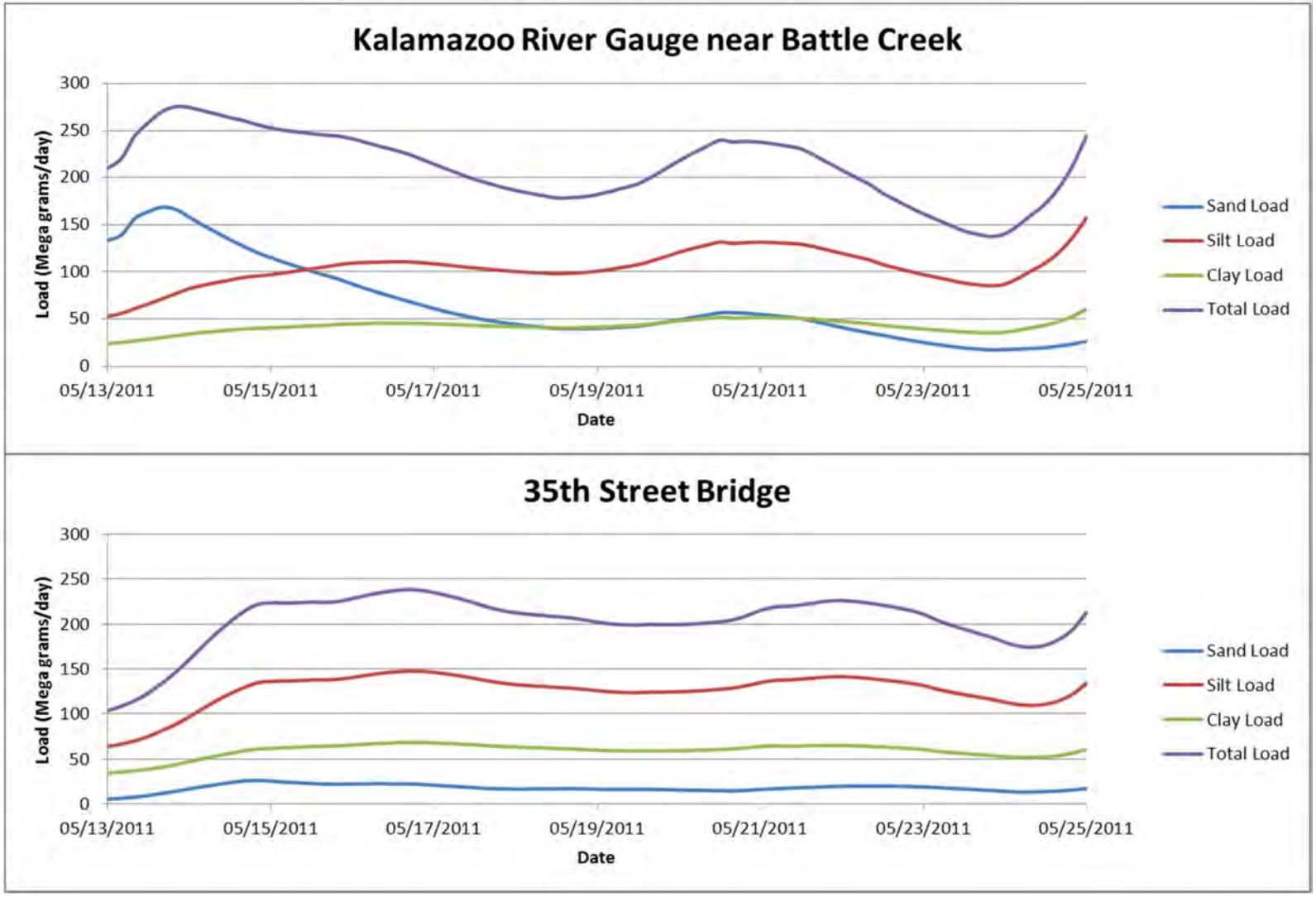
ENBRIDGE

Drawn:	MB	4/17/2012
Approved:	JLH	4/17/2012
Project #:	106-4186	

RIVERINE SIMULATED SEDIMENT MASS FLUX (MEGAGRAMS PER DAY) IN KALAMAZOO RIVER VALIDATION

SHEET 1 OF 6

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP



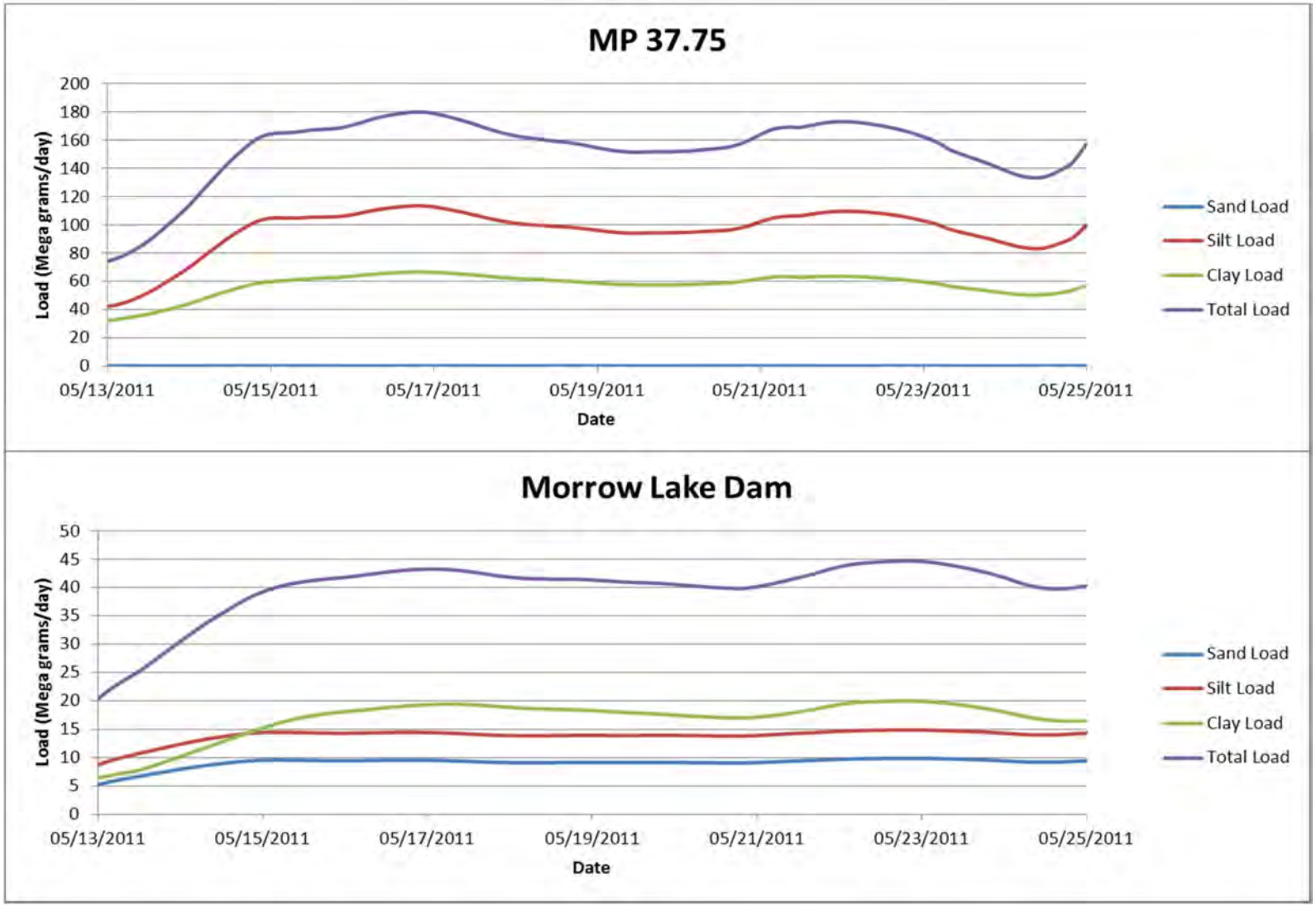
ENBRIDGE

Drawn:	MB	4/17/2012
Approved:	JLH	4/17/2012
Project #:	106-4186	

RIVERINE SIMULATED SEDIMENT MASS FLUX (MEGAGRAMS PER DAY) IN KALAMAZOO RIVER VALIDATION

SHEET 2 OF 6

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP



ENBRIDGE

Drawn:	MB	4/17/2012
Approved:	JLH	4/17/2012
Project #:	106-4186	

RIVERINE SIMULATED SEDIMENT MASS FLUX (MEGAGRAMS PER DAY) IN KALAMAZOO RIVER VALIDATION

SHEET 3 OF 6

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP

Date/Time	Ceresco Dam			Kalamazoo Dam			Kalamazoo River Gauge Near Battle Creek			35th Street Bridge			MP 37.75			Morrow Lake Dam		
	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)
5/13/2011 0:00	2.4	25.5	9.0	1.544	25.2	12.2	133.5	52.8	23.89	5.36	64	34.2	0	42.1	32.07	5.17	8.69	6.362
5/13/2011 3:59	2.6	27.0	9.4	1.675	26.8	12.8	139.3	56	25.12	6.26	66.8	35.4	0	44	33.34	5.79	9.51	6.858
5/13/2011 8:00	2.8	28.9	9.9	1.834	29.1	13.7	156.8	61.1	26.81	7.65	70.3	36.9	0	47.4	34.88	6.27	10.2	7.312
5/13/2011 12:00	3.0	32.1	10.9	1.993	31.4	14.5	164.1	66.1	28.47	9.43	75.2	38.7	0	51.9	36.68	6.7	10.7	7.732
5/13/2011 15:59	3.2	34.9	11.8	2.155	33.7	15.3	168.6	71.5	30.17	11.7	81.7	40.9	0	57.5	38.83	7.12	11.3	8.514
5/13/2011 20:00	3.2	36.7	12.4	2.284	36.4	16.3	166.4	76.8	32.18	14.1	88.5	43.8	0	63.5	41.2	7.53	11.8	9.333
5/14/2011 0:00	3.2	38.4	12.9	2.325	38.7	17.2	158.2	82.3	34.21	16.7	96.8	47	0	69.8	44.02	7.94	12.4	10.15
5/14/2011 3:59	3.2	40.2	13.5	2.348	40.4	18	149.6	85.8	35.72	19.2	106	50.4	0	77.1	47.37	8.32	12.9	11.02
5/14/2011 8:00	3.2	41.2	13.9	2.37	41.7	18.6	142	88.7	37.03	21.5	115	53.6	0	84.4	50.51	8.67	13.3	11.89
5/14/2011 12:00	3.2	41.3	13.9	2.395	43	19.2	134.2	91.4	38.2	23.8	122	56.4	0	91.5	53.46	8.95	13.7	12.72
5/14/2011 15:59	3.2	41.6	14.0	2.407	44.3	19.8	127.1	94.2	39.45	25.6	129	59.1	0	97.5	56.17	9.21	14	13.59
5/14/2011 20:00	3.3	42.0	14.1	2.418	44.5	20	120.5	95.7	40.08	26.2	135	61.1	0	102	58.55	9.43	14.3	14.44
5/15/2011 0:00	3.3	42.4	14.2	2.45	44.9	20.2	115.1	97.1	40.62	25.4	136	62	0	105	59.75	9.54	14.4	15.25
5/15/2011 3:59	3.4	42.9	14.3	2.486	45.4	20.4	110.1	99.1	41.28	24.4	136	62.6	0	105	60.4	9.56	14.5	15.99
5/15/2011 8:00	3.4	43.5	14.5	2.524	46.1	20.6	105.4	101	42.02	23.5	137	63.3	0	105	61.05	9.55	14.5	16.62
5/15/2011 12:00	3.5	44.4	14.8	2.561	46.7	20.8	100.9	103	42.75	22.8	138	64	0	105	61.76	9.51	14.4	17.11
5/15/2011 15:59	3.5	45.0	15.0	2.607	47.4	21.1	96.48	105	43.44	22.1	138	64.2	0	105	62.29	9.48	14.4	17.51
5/15/2011 20:00	3.5	45.2	15.1	2.642	48.2	21.4	92.21	108	44.29	21.9	139	64.7	0	106	62.69	9.44	14.3	17.83
5/16/2011 0:00	3.4	45.3	15.1	2.633	48.7	21.6	87.08	109	44.87	22.1	141	65.7	0	107	63.47	9.44	14.3	18.06
5/16/2011 3:59	3.4	45.5	15.2	2.616	48.8	21.7	82.16	110	45.19	22.4	143	66.6	0	109	64.45	9.46	14.3	18.29
5/16/2011 8:00	3.4	45.2	15.1	2.6	48.8	21.7	77.65	110	45.36	22.5	145	67.4	0	111	65.25	9.49	14.4	18.53
5/16/2011 12:00	3.3	44.6	14.9	2.584	48.8	21.7	73.47	111	45.56	22.4	147	68	0	112	65.86	9.53	14.4	18.79
5/16/2011 15:59	3.3	43.8	14.7	2.556	48.7	21.7	69.2	111	45.64	22.3	148	68.4	0	113	66.35	9.55	14.5	18.99
5/16/2011 20:00	3.2	42.9	14.4	2.519	47.9	21.4	65.06	110	45.3	21.8	148	68.4	0	113	66.55	9.56	14.5	19.17
5/17/2011 0:00	3.1	42.0	14.1	2.47	47	21.1	61.07	109	44.84	20.9	146	67.9	0	113	66.27	9.54	14.4	19.31
5/17/2011 3:59	3.1	41.1	13.9	2.421	46	20.7	57.42	107	44.29	20	144	67.3	0	111	65.73	9.49	14.4	19.39
5/17/2011 8:00	3.0	40.2	13.6	2.372	45.1	20.4	54.1	106	43.73	19	142	66.7	0	109	65.11	9.42	14.3	19.39
5/17/2011 12:00	2.9	39.2	13.3	2.323	44.1	20	51.01	104	43.11	18.1	140	65.8	0	107	64.36	9.34	14.2	19.33
5/17/2011 15:59	2.9	38.2	13.0	2.28	43.2	19.6	48.53	103	42.67	17.2	137	64.8	0	105	63.42	9.25	14.1	19.2
5/17/2011 20:00	2.9	37.4	12.7	2.24	42.2	19.2	46.27	102	42.15	16.7	134	64	0	103	62.56	9.16	13.9	19.01
5/18/2011 0:00	2.8	36.7	12.5	2.214	41.4	18.9	44.4	100	41.68	16.6	133	63.4	0	101	61.94	9.11	13.9	18.85

ENBRIDGE

Drawn: MB 4/17/2012

Approved: JLH 4/17/2012

Project #: 106-4186

Footnotes:
Mg=Megagrams
MP=Mile Post

RIVERINE SIMULATED SEDIMENT MASS FLUX (MEGAGRAMS PER DAY) IN KALAMAZOO RIVER VALIDATION

SHEET 4 OF 6

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP

Date/Time	Ceresco Dam			Kalamazoo Dam			Kalamazoo River Gauge Near Battle Creek			35th Street Bridge			MP 37.75			Morrow Lake Dam		
	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)
5/18/2011 3:59	2.8	35.9	12.2	2.188	40.6	18.6	42.73	99.6	41.3	16.6	131	62.8	0	100	61.42	9.09	13.9	18.69
5/18/2011 8:00	2.8	35.2	12.0	2.164	39.9	18.3	41.22	98.9	40.97	16.7	130	62.3	0	99.4	60.86	9.09	13.9	18.59
5/18/2011 12:00	2.7	34.6	11.8	2.141	39.3	18	39.84	98.1	40.62	16.9	130	61.8	0	98.8	60.39	9.11	13.9	18.51
5/18/2011 15:59	2.7	34.2	11.7	2.123	38.6	17.7	39.55	98.6	40.71	17	129	61.3	0	98.2	59.93	9.13	13.9	18.45
5/18/2011 20:00	2.8	34.1	11.7	2.117	38.2	17.6	39.51	99.3	40.91	16.7	128	60.6	0	97.3	59.28	9.15	13.9	18.38
5/19/2011 0:00	2.8	34.1	11.6	2.141	38.1	17.5	40.03	101	41.37	16.4	126	59.9	0	96.1	58.53	9.15	13.9	18.27
5/19/2011 3:59	2.8	34.0	11.6	2.167	38.2	17.5	40.69	103	42.03	16.2	125	59.4	0	94.9	57.92	9.14	13.9	18.13
5/19/2011 8:00	2.8	34.1	11.6	2.194	38.5	17.6	41.46	105	42.79	16.2	124	59.1	0	94.2	57.57	9.13	13.9	18
5/19/2011 12:00	2.8	34.5	11.7	2.222	38.7	17.6	42.32	108	43.56	16.2	124	59	0	94	57.43	9.13	13.9	17.87
5/19/2011 15:59	2.9	34.8	11.8	2.26	39	17.7	44.38	112	44.85	16.3	124	59.2	0	94.2	57.42	9.15	13.9	17.76
5/19/2011 20:00	2.9	35.1	11.9	2.302	39.6	17.9	46.68	116	46.36	16	124	59.1	0	94.3	57.41	9.16	13.9	17.63
5/20/2011 0:00	2.9	35.3	12.0	2.339	40.2	18.1	49.11	121	47.96	15.6	125	59.3	0	94.4	57.43	9.14	13.9	17.48
5/20/2011 3:59	2.9	35.6	12.1	2.374	40.7	18.3	51.48	125	49.38	15.3	125	59.6	0	94.7	57.67	9.12	13.9	17.34
5/20/2011 8:00	2.9	35.8	12.2	2.41	41.2	18.5	54.02	128	50.51	15.1	126	60	0	95.3	58.03	9.09	13.9	17.21
5/20/2011 12:00	2.9	35.9	12.2	2.446	41.7	18.7	56.56	132	51.64	14.7	127	60.5	0	95.7	58.46	9.07	13.8	17.1
5/20/2011 15:59	2.9	35.8	12.2	2.46	41.9	18.8	56.7	130	51.01	14.5	129	61.3	0	96.7	59.06	9.05	13.8	17.02
5/20/2011 20:00	2.9	35.5	12.1	2.456	42	18.8	56.09	131	51.3	15.1	132	62.7	0	98.8	60.25	9.05	13.8	16.99
5/21/2011 0:00	2.8	35.1	12.0	2.425	41.7	18.7	54.91	132	51.4	16.2	135	64.1	0	102	61.87	9.12	13.9	17.12
5/21/2011 3:59	2.8	34.8	11.9	2.39	41.2	18.6	53.56	131	51.25	16.9	137	64.7	0	105	62.92	9.22	14	17.35
5/21/2011 8:00	2.8	34.3	11.7	2.356	40.7	18.4	52.14	130	51.04	17.5	138	64.4	0	106	63.15	9.33	14.2	17.65
5/21/2011 12:00	2.7	33.7	11.5	2.321	40.2	18.2	50.51	130	50.71	18	139	64.5	0	106	62.71	9.42	14.3	18
5/21/2011 15:59	2.7	33.0	11.3	2.286	39.6	18	47.41	127	49.76	18.6	140	64.9	0	108	63.14	9.51	14.4	18.41
5/21/2011 20:00	2.7	32.3	11.1	2.251	38.9	17.7	44.15	123	48.59	19.3	141	65.3	0	109	63.46	9.61	14.5	18.9
5/22/2011 0:00	2.6	31.7	10.9	2.223	38.3	17.5	41.04	120	47.4	19.7	141	65.2	0	110	63.51	9.69	14.6	19.34
5/22/2011 3:59	2.6	31.0	10.7	2.193	37.6	17.2	38.08	116	46.22	19.7	141	64.7	0	109	63.25	9.76	14.7	19.65
5/22/2011 8:00	2.6	30.5	10.6	2.162	36.8	16.9	35.29	113	45.07	19.8	140	64.1	0	109	62.76	9.81	14.8	19.78
5/22/2011 12:00	2.5	30.0	10.4	2.133	36.2	16.7	32.72	108	43.15	19.8	138	63.4	0	108	62.13	9.84	14.8	19.87
5/22/2011 15:59	2.5	29.5	10.2	2.093	35.4	16.4	30.02	104	41.87	19.7	136	62.6	0	107	61.43	9.86	14.9	19.94
5/22/2011 20:00	2.5	29.0	10.1	2.046	34.7	16.1	27.45	101	40.6	19.4	134	61.7	0	105	60.56	9.88	14.9	19.98
5/23/2011 0:00	2.4	28.6	9.9	2.004	34	15.8	25.1	97.2	39.39	18.9	132	60.6	0	103	59.47	9.87	14.9	19.91
5/23/2011 3:59	2.4	28.1	9.8	1.965	33.4	15.5	22.96	94.3	38.32	18.1	128	58.7	0	100	58.31	9.83	14.8	19.75

ENBRIDGE

Drawn: MB 4/17/2012

Approved: JLH 4/17/2012

Project #: 106-4186

Footnotes:
Mg=Megagrams
MP=Mile Post

RIVERINE SIMULATED SEDIMENT MASS FLUX (MEGAGRAMS PER DAY) IN KALAMAZOO RIVER VALIDATION

SHEET 5 OF 6

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP

Date/Time	Ceresco Dam			Kalamazoo Dam			Kalamazoo River Gauge Near Battle Creek			35th Street Bridge			MP 37.75			Morrow Lake Dam		
	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)
5/23/2011 8:00	2.4	27.7	9.7	1.927	32.8	15.3	21	91.2	37.25	17.4	124	57.3	0	96.6	56.31	9.77	14.7	19.51
5/23/2011 12:00	2.4	27.4	9.6	1.889	32.2	15	19.19	88.1	36.18	16.7	122	56.2	0	94.2	55.1	9.7	14.7	19.22
5/23/2011 15:59	2.4	27.8	9.7	1.872	31.8	14.8	18.04	86.4	35.56	15.9	119	55	0	92	54.02	9.63	14.6	18.87
5/23/2011 20:00	2.7	30.1	10.3	1.897	31.8	14.9	17.23	85.3	35.18	15	116	54	0	89.6	52.87	9.55	14.5	18.49
5/24/2011 0:00	3.0	32.4	11.0	2.088	33.7	15.6	17.51	86.9	35.9	14	113	52.7	0	86.9	51.61	9.44	14.3	18.04
5/24/2011 3:59	3.4	34.7	11.6	2.321	36.7	16.7	18.03	93.4	38.12	13.3	110	51.8	0	84.5	50.57	9.31	14.1	17.5
5/24/2011 8:00	3.9	38.6	12.8	2.587	40.4	18	18.77	102	40.78	13.3	109	51.6	0	83.2	50.14	9.22	14	17.02
5/24/2011 12:00	4.3	44.7	14.7	2.877	44.4	19.4	19.51	110	43.5	13.7	111	52.3	0	83.6	50.45	9.2	14	16.68
5/24/2011 15:59	4.9	51.4	16.8	3.26	49.2	21	21.42	121	47.37	14.4	115	53.9	0	86.7	51.58	9.23	14	16.49
5/24/2011 20:00	5.6	59.5	19.3	3.664	56.4	23.8	23.36	137	52.95	15.5	122	56.6	0	90.8	53.56	9.33	14.2	16.42
5/25/2011 0:00	6.8	68.2	22.0	4.412	66.4	27.6	26.59	157	60.46	17.4	134	61.3	0	99.8	57.39	9.49	14.4	16.49

ENBRIDGE

Drawn: MB 4/17/2012

Approved: JLH 4/17/2012

Project #: 106-4186

Footnotes:
Mg=Megagrams
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RIVERINE SIMULATED SEDIMENT MASS FLUX (MEGAGRAMS PER DAY) IN KALAMAZOO RIVER VALIDATION

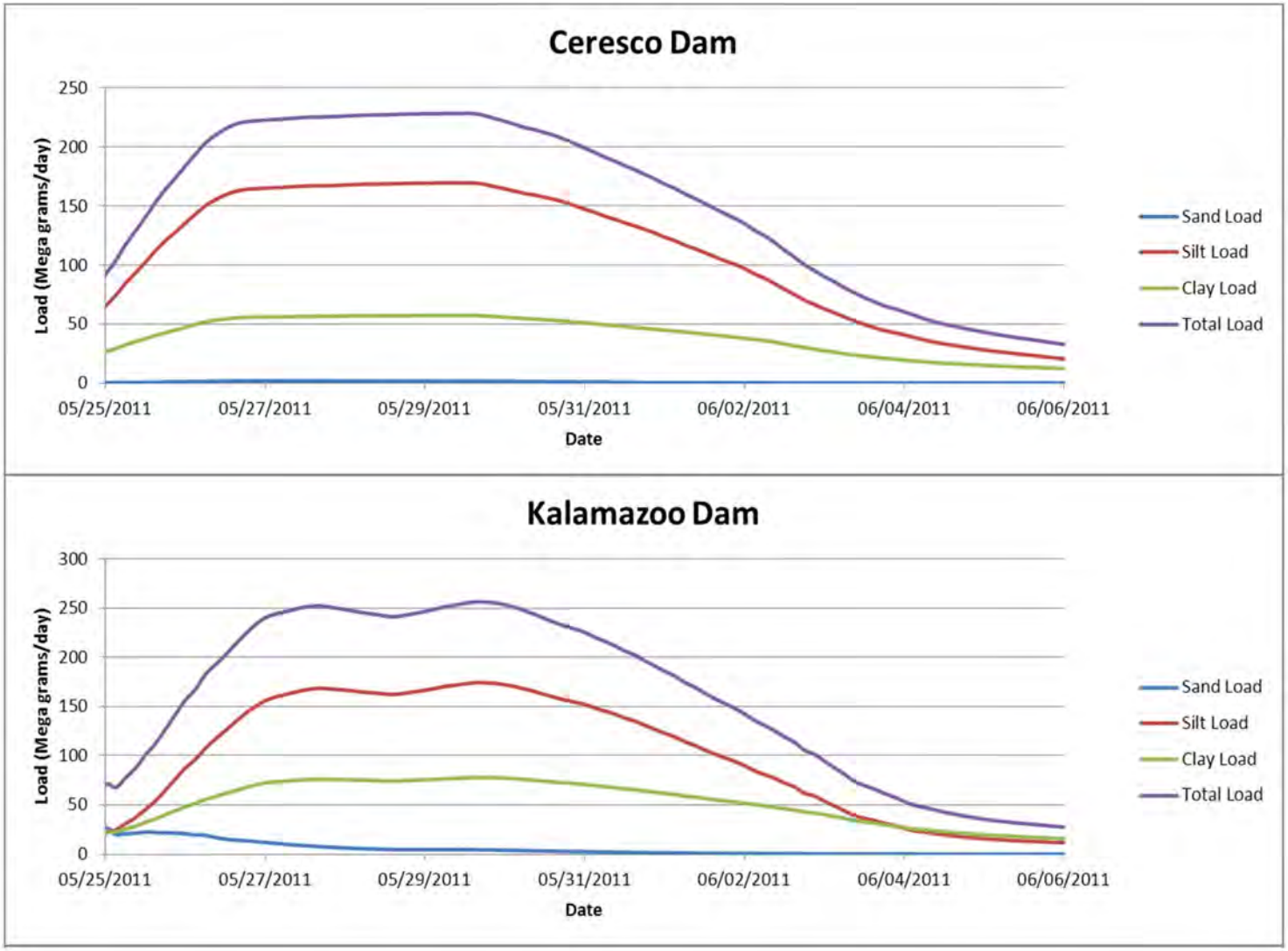
SHEET 6 OF 6

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP

Figure 5-6

Floodplain Simulated Sediment Mass Flux (Megagrams per Day) in Kalamazoo River Validation

Sheets 1 through 7



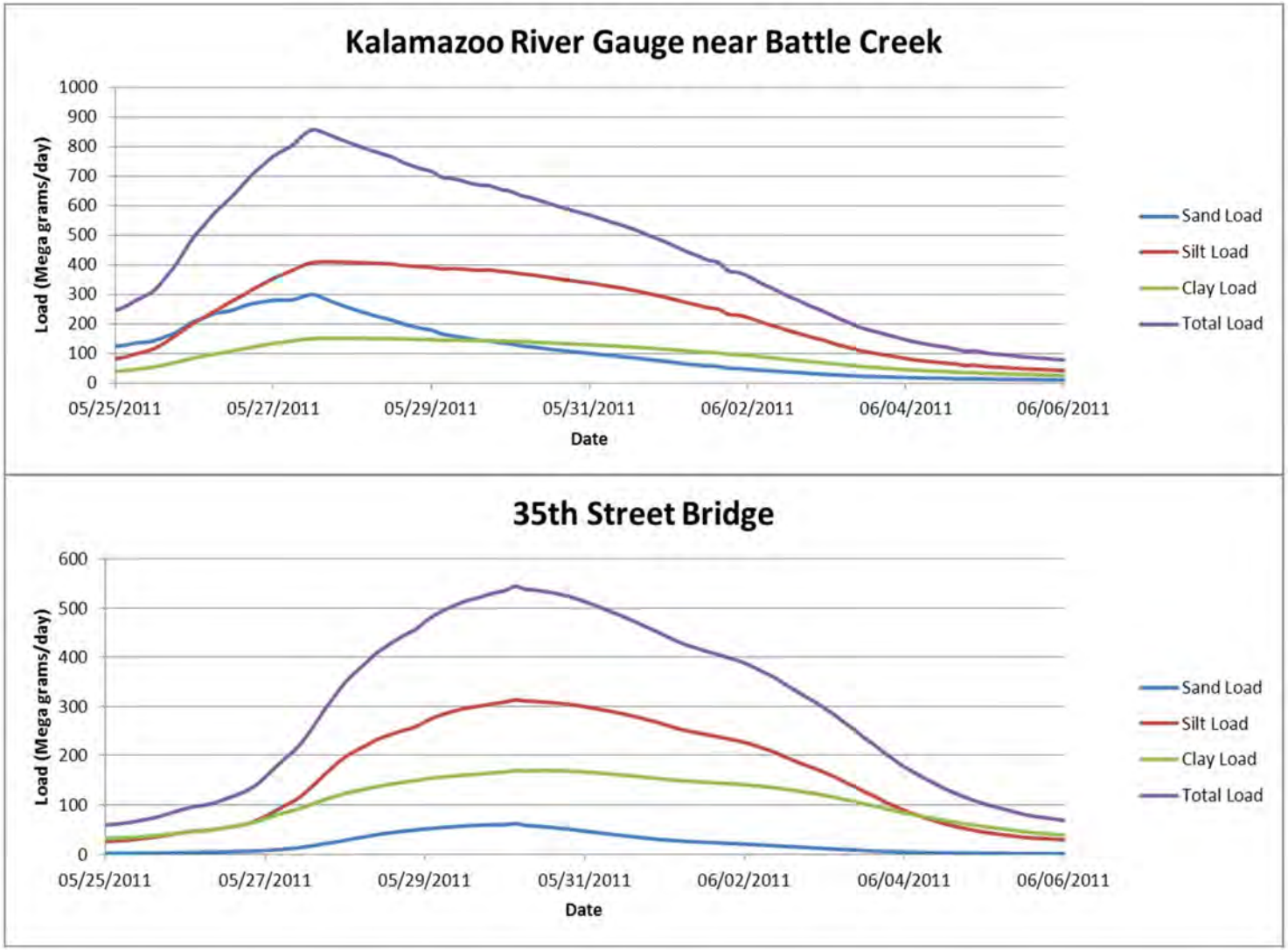
ENBRIDGE

Drawn:	MB	4/17/2012
Approved:	JLH	4/17/2012
Project #:	106-4186	

FLOODPLAIN SIMULATED SEDIMENT MASS FLUX (MEGAGRAMS PER DAY) IN KALAMAZOO RIVER VALIDATION

SHEET 1 OF 7

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP



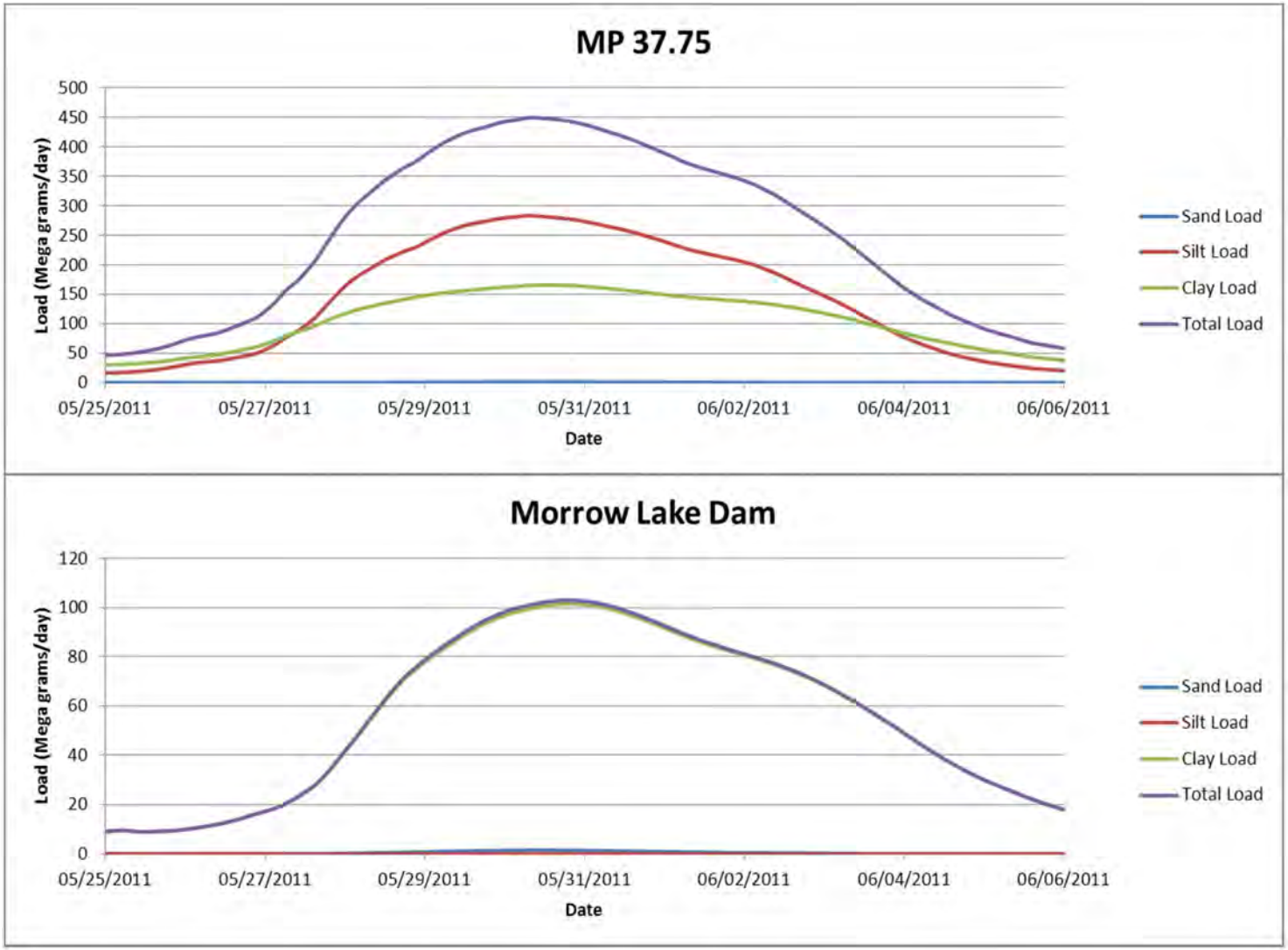
ENBRIDGE

Drawn:	MB 4/17/2012
Approved:	JLH 4/17/2012
Project #:	106-4186

FLOODPLAIN SIMULATED SEDIMENT MASS FLUX (MEGAGRAMS PER DAY) IN KALAMAZOO RIVER VALIDATION

SHEET 2 OF 7

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP



ENBRIDGE

Drawn:	MB	4/17/2012
Approved:	JLH	4/17/2012
Project #:	106-4186	

FLOODPLAIN SIMULATED SEDIMENT MASS FLUX (MEGAGRAMS PER DAY) IN KALAMAZOO RIVER VALIDATION

SHEET 3 OF 7

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP

Date/Time	Ceresco Dam			Kalamazoo Dam			Kalamazoo River Gauge Near Battle Creek			35th Street Bridge			MP 37.75			Morrow Lake Dam		
	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)
5/25/2011 0:00	0.3	65.4	26.5	27.1	21.7	22.2	124.4	81.0	39.7	1.6	25.5	32.2	0.0	16.5	29.8	0.0	0.0	9.1
5/25/2011 3:07	0.3	74.3	29.3	20.0	24.9	22.7	128.2	88.3	42.4	1.7	26.6	32.9	0.0	16.7	30.5	0.0	0.0	9.5
5/25/2011 6:00	0.4	84.5	32.3	20.9	30.9	25.6	135.1	97.2	45.9	1.7	28.1	33.6	0.0	17.5	31.2	0.0	0.0	9.6
5/25/2011 9:07	0.5	93.5	35.1	21.4	37.5	28.6	138.2	106.8	50.0	1.7	30.1	34.8	0.0	18.5	32.1	0.0	0.0	9.1
5/25/2011 12:00	0.5	102.4	37.7	22.6	45.6	32.5	143.6	117.2	54.5	1.8	32.5	36.3	0.0	20.1	33.4	0.0	0.0	9.0
5/25/2011 15:07	0.6	112.3	40.3	22.1	54.6	36.0	156.7	136.8	61.5	2.0	34.8	37.7	0.0	21.8	34.8	0.0	0.0	9.2
5/25/2011 18:00	0.9	120.5	42.6	21.8	64.8	40.3	168.2	157.8	69.0	2.3	38.0	39.9	0.0	24.2	36.7	0.0	0.0	9.3
5/25/2011 21:07	1.1	128.0	44.9	21.5	76.6	44.4	189.7	181.9	77.3	2.8	41.6	42.5	0.0	27.2	39.0	0.0	0.0	9.6
5/26/2011 0:00	1.1	135.5	47.2	20.9	87.5	48.3	208.7	204.0	84.6	3.3	44.5	44.5	0.0	30.5	41.6	0.0	0.0	10.0
5/26/2011 3:07	1.3	143.2	49.6	19.5	96.6	51.7	221.3	223.5	91.2	3.6	47.5	46.0	0.0	33.4	43.4	0.0	0.0	10.6
5/26/2011 6:00	1.4	150.2	51.7	19.4	107.4	55.7	234.6	242.3	97.4	3.8	48.3	47.7	0.0	35.3	44.6	0.0	0.0	11.2
5/26/2011 9:07	1.5	155.4	53.1	16.9	117.2	58.7	240.7	262.5	103.9	4.0	50.6	50.6	0.0	36.6	46.7	0.0	0.0	11.9
5/26/2011 12:00	1.6	159.4	54.2	15.4	125.4	61.5	247.7	280.9	109.8	4.6	54.0	53.7	0.0	39.0	49.8	0.0	0.0	12.7
5/26/2011 15:07	1.7	162.4	55.2	14.4	134.6	64.6	261.4	299.3	115.9	5.2	57.0	57.3	0.0	42.2	53.1	0.0	0.0	13.7
5/26/2011 18:00	1.8	163.9	55.5	13.7	142.8	67.3	269.8	319.1	122.2	5.9	60.5	61.0	0.0	45.3	56.6	0.0	0.0	14.9
5/26/2011 21:07	1.8	164.5	55.7	12.9	150.2	70.4	275.1	336.9	128.4	6.5	67.6	65.6	0.0	49.2	60.2	0.0	0.0	16.2
5/27/2011 0:00	1.8	165.0	55.9	12.0	156.0	72.3	279.8	354.4	134.1	7.4	76.8	71.8	0.0	56.0	65.1	0.0	0.0	17.3
5/27/2011 3:07	1.8	165.4	56.0	11.0	159.7	73.4	280.6	369.2	138.6	8.9	88.3	79.1	0.0	65.0	72.0	0.0	0.0	18.6
5/27/2011 6:00	1.8	165.9	56.1	10.1	162.2	74.2	282.0	382.5	142.6	10.6	99.2	84.8	0.0	76.0	79.2	0.1	0.0	20.4
5/27/2011 9:07	1.8	166.4	56.3	9.4	164.8	74.9	293.1	398.8	147.8	12.3	110.1	90.0	0.0	85.3	84.4	0.1	0.0	22.6
5/27/2011 12:00	1.8	166.8	56.4	8.8	166.9	75.5	299.7	408.0	150.4	14.8	124.5	96.5	0.0	96.4	89.9	0.1	0.0	25.0
5/27/2011 15:07	1.7	167.0	56.5	8.1	168.3	75.9	287.7	410.1	151.1	17.8	143.5	104.4	0.0	110.7	96.9	0.1	0.0	27.9
5/27/2011 18:00	1.7	167.1	56.6	7.5	168.3	76.0	274.3	410.1	151.2	21.7	162.5	111.2	0.0	128.4	103.7	0.1	0.0	31.8
5/27/2011 21:07	1.7	167.3	56.6	6.9	167.5	75.8	261.9	409.4	151.2	24.6	181.2	117.6	0.0	147.2	111.3	0.2	0.0	36.7
5/28/2011 0:00	1.7	167.7	56.7	6.4	166.7	75.6	250.7	408.2	151.0	28.3	197.1	123.4	0.0	163.9	116.9	0.2	0.0	41.7
5/28/2011 3:07	1.7	168.1	56.7	5.9	165.6	75.2	240.3	407.0	150.8	32.2	209.2	128.2	0.1	177.6	122.8	0.3	0.0	46.6
5/28/2011 6:00	1.7	168.4	56.8	5.5	164.5	75.0	230.1	405.8	150.6	35.2	219.5	132.0	0.2	188.1	126.8	0.4	0.0	51.8
5/28/2011 9:07	1.7	168.4	56.8	5.2	163.7	74.7	220.9	404.5	150.3	39.1	231.1	136.5	0.2	198.4	130.9	0.5	0.0	57.1
5/28/2011 12:00	1.7	168.7	56.9	4.9	162.7	74.4	212.9	403.1	150.1	42.0	238.9	139.9	0.3	208.2	134.7	0.5	0.0	62.2
5/28/2011 15:07	1.7	168.8	56.9	4.7	162.3	74.3	201.2	398.2	148.8	44.7	246.1	143.2	0.4	216.0	138.3	0.6	0.0	67.0
5/28/2011 18:00	1.7	169.0	57.0	4.6	163.6	74.6	192.6	395.9	148.0	47.2	252.2	146.4	0.4	223.3	141.6	0.7	0.0	71.2

ENBRIDGE

Drawn: MB 4/17/2012

Approved: JLH 4/17/2012

Project #: 106-4186

Footnotes:
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FLOODPLAIN SIMULATED SEDIMENT MASS FLUX (MEGAGRAMS PER DAY) IN KALAMAZOO RIVER VALIDATION

SHEET 4 OF 7

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP

Date/Time	Ceresco Dam			Kalamazoo Dam			Kalamazoo River Gauge Near Battle Creek			35th Street Bridge			MP 37.75			Morrow Lake Dam		
	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)
5/28/2011 21:07	1.6	169.2	57.1	4.6	165.1	75.0	184.4	393.2	147.1	49.0	258.1	149.0	0.5	229.1	144.5	0.7	0.0	74.7
5/29/2011 0:00	1.6	169.3	57.1	4.6	166.5	75.5	179.2	391.3	146.7	51.2	268.9	152.5	0.6	237.6	147.7	0.8	0.0	78.1
5/29/2011 3:07	1.6	169.4	57.1	4.6	168.5	76.0	166.0	386.4	144.6	53.0	278.5	155.0	0.7	246.8	150.3	1.0	0.0	81.0
5/29/2011 6:00	1.6	169.5	57.1	4.6	170.4	76.5	160.4	387.7	145.1	54.6	285.2	157.0	0.7	254.6	152.5	1.1	0.0	83.7
5/29/2011 9:07	1.6	169.4	57.2	4.5	171.8	76.8	154.7	386.3	144.4	55.9	291.2	158.7	0.8	261.1	154.4	1.1	0.0	86.4
5/29/2011 12:00	1.6	169.5	57.2	4.5	173.1	77.4	149.1	383.2	143.8	57.6	296.1	160.3	0.9	266.6	156.1	1.2	0.0	89.0
5/29/2011 15:07	1.6	169.4	57.2	4.5	174.3	77.6	144.5	382.0	143.4	58.5	299.3	161.7	1.0	270.5	157.5	1.3	0.0	91.4
5/29/2011 18:00	1.5	168.2	56.8	4.4	174.2	77.7	141.6	382.6	143.4	59.2	302.7	163.4	1.1	273.1	158.9	1.3	0.0	93.5
5/29/2011 21:07	1.5	166.2	56.3	4.3	173.5	77.5	135.5	377.4	142.1	60.0	306.3	165.3	1.1	276.8	160.6	1.4	0.0	95.3
5/30/2011 0:00	1.4	164.4	55.7	4.1	172.2	77.2	133.2	375.2	141.6	59.8	308.8	166.7	1.2	279.5	162.1	1.4	0.0	96.9
5/30/2011 3:07	1.4	162.5	55.2	3.9	170.2	76.6	125.7	369.9	139.5	62.2	313.0	169.3	1.2	280.8	162.8	1.5	0.0	98.1
5/30/2011 6:00	1.3	160.5	54.6	3.7	167.8	75.8	122.5	366.8	138.7	58.6	311.1	168.8	1.3	282.9	164.4	1.5	0.0	99.0
5/30/2011 9:07	1.2	159.2	54.1	3.5	165.1	75.0	118.4	362.0	137.2	57.2	310.1	169.4	1.3	282.7	165.0	1.5	0.0	100.0
5/30/2011 12:00	1.1	157.3	53.6	3.2	162.1	74.1	114.2	357.0	135.6	55.5	308.6	169.5	1.3	281.3	165.2	1.5	0.0	100.7
5/30/2011 15:07	1.0	155.4	53.0	3.1	159.2	73.1	110.3	351.8	133.9	53.6	307.3	169.4	1.3	280.0	165.3	1.5	0.0	101.2
5/30/2011 18:00	1.0	153.0	52.3	2.9	156.6	72.3	106.9	347.2	132.5	51.5	305.4	168.8	1.2	278.2	164.9	1.5	0.0	101.5
5/30/2011 21:07	0.9	150.1	51.6	2.7	154.4	71.7	103.7	342.7	131.1	49.2	302.8	167.9	1.2	276.1	164.2	1.5	0.0	101.5
5/31/2011 0:00	0.9	147.4	50.8	2.6	152.1	70.8	100.1	338.8	129.6	46.8	299.5	166.7	1.1	273.3	163.2	1.4	0.0	101.2
5/31/2011 3:07	0.8	144.4	50.1	2.4	148.4	69.6	96.5	333.3	127.7	44.4	295.9	165.3	1.0	269.8	161.8	1.4	0.0	100.7
5/31/2011 6:00	0.7	141.3	49.3	2.2	145.5	68.6	93.4	328.0	126.1	41.9	292.0	163.5	1.0	266.0	160.2	1.3	0.0	99.9
5/31/2011 9:07	0.7	138.6	48.6	2.1	142.1	67.4	89.8	322.6	124.2	39.6	288.3	161.9	0.9	262.4	158.6	1.2	0.0	98.9
5/31/2011 12:00	0.5	135.7	47.9	1.9	138.4	66.3	86.9	316.7	122.4	37.4	284.1	160.0	0.8	258.6	156.9	1.2	0.0	97.7
5/31/2011 15:07	0.5	133.0	47.1	1.8	135.1	65.3	83.4	310.0	120.3	35.0	279.4	158.1	0.8	254.2	155.0	1.1	0.0	96.3
5/31/2011 18:00	0.3	130.1	46.3	1.7	131.0	64.1	79.2	302.2	117.9	32.9	274.3	156.1	0.7	249.3	153.1	1.0	0.0	94.8
5/31/2011 21:07	0.3	127.0	45.5	1.5	126.7	62.9	75.5	294.9	115.7	30.9	268.9	154.1	0.7	244.2	151.0	1.0	0.0	93.3
6/1/2011 0:00	0.2	123.5	44.7	1.4	122.8	61.8	72.1	287.5	113.4	29.1	263.2	152.1	0.6	239.0	149.1	0.9	0.0	91.7
6/1/2011 3:07	0.2	120.7	44.0	1.3	119.1	60.6	67.3	279.0	110.7	27.6	256.8	150.3	0.6	233.4	147.3	0.9	0.0	90.0
6/1/2011 6:00	0.2	116.8	43.2	1.2	114.2	59.2	63.3	270.9	108.3	26.3	251.4	148.6	0.5	227.7	145.6	0.8	0.0	88.4
6/1/2011 9:07	0.2	113.8	42.3	1.1	110.4	58.1	60.4	263.1	106.0	25.2	247.3	147.2	0.5	223.2	144.1	0.8	0.0	86.9
6/1/2011 12:00	0.2	110.5	41.4	1.0	105.8	56.9	57.7	254.3	103.6	24.1	243.3	145.9	0.5	219.4	142.7	0.7	0.0	85.5
6/1/2011 15:07	0.2	107.0	40.6	0.9	101.7	55.3	56.3	250.5	101.7	23.3	239.6	144.6	0.4	215.7	141.5	0.7	0.0	84.2

ENBRIDGE

Drawn: MB 4/17/2012

Approved: JLH 4/17/2012

Project #: 106-4186

Footnotes:
Mg=Megagrams
MP=Mile Post

FLOODPLAIN SIMULATED SEDIMENT MASS FLUX (MEGAGRAMS PER DAY) IN KALAMAZOO RIVER VALIDATION

SHEET 5 OF 7

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP

Date/Time	Ceresco Dam			Kalamazoo Dam			Kalamazoo River Gauge Near Battle Creek			35th Street Bridge			MP 37.75			Morrow Lake Dam		
	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)
6/1/2011 18:00	0.2	103.7	39.7	0.8	98.1	54.3	49.9	232.8	97.1	22.4	235.7	143.5	0.4	212.2	140.3	0.6	0.0	82.9
6/1/2011 21:07	0.1	100.5	38.8	0.8	94.0	53.3	49.0	229.5	95.8	21.5	231.5	142.3	0.4	208.3	139.1	0.5	0.0	81.7
6/2/2011 0:00	0.1	97.1	37.9	0.7	90.0	51.9	46.7	222.1	93.6	20.5	227.0	140.8	0.3	204.3	137.8	0.5	0.0	80.6
6/2/2011 3:07	0.1	92.2	36.8	0.7	84.5	50.5	43.7	210.3	89.5	19.4	220.5	138.9	0.3	199.1	136.1	0.5	0.0	79.4
6/2/2011 6:00	0.1	88.8	36.0	0.6	80.9	49.3	41.8	199.1	86.6	18.3	213.8	136.9	0.2	192.7	134.2	0.5	0.0	78.1
6/2/2011 9:07	0.1	84.1	34.7	0.5	77.0	47.7	39.3	189.5	83.1	17.1	206.9	134.6	0.2	186.2	132.1	0.4	0.0	76.8
6/2/2011 12:00	0.1	79.5	33.1	0.5	72.3	46.4	37.1	178.1	79.6	16.0	198.1	131.9	0.2	178.6	129.5	0.4	0.0	75.4
6/2/2011 15:07	0.1	74.7	31.5	0.4	68.1	44.8	35.5	169.2	76.3	14.9	189.2	129.0	0.1	170.0	126.9	0.4	0.0	73.8
6/2/2011 18:00	0.0	70.3	30.0	0.4	61.8	43.3	33.0	159.0	73.3	13.7	181.4	126.1	0.1	162.2	124.0	0.3	0.0	72.1
6/2/2011 21:07	0.0	66.3	28.6	0.4	59.3	41.7	30.8	150.5	70.2	12.6	173.7	123.0	0.0	154.7	120.9	0.3	0.0	70.3
6/3/2011 0:00	0.0	62.8	27.4	0.3	54.0	40.4	28.8	141.2	67.1	11.5	165.6	119.6	0.0	146.8	117.6	0.3	0.0	68.3
6/3/2011 3:07	0.0	59.4	26.1	0.3	49.0	38.2	27.1	130.0	63.9	10.3	156.7	115.5	0.0	138.8	113.9	0.2	0.0	66.2
6/3/2011 6:00	0.0	56.0	24.8	0.3	44.3	36.6	25.4	122.0	60.8	9.4	146.5	111.3	0.0	130.8	110.4	0.2	0.0	63.9
6/3/2011 9:07	0.0	52.5	23.7	0.2	39.2	34.2	23.0	112.1	56.9	8.4	136.9	107.0	0.0	121.3	106.0	0.2	0.0	61.6
6/3/2011 12:00	0.0	49.6	22.7	0.2	36.6	32.9	22.1	105.4	54.4	7.4	126.7	102.3	0.0	112.2	101.4	0.1	0.0	59.2
6/3/2011 15:07	0.0	46.9	21.8	0.2	34.2	31.5	21.3	99.6	52.3	6.2	117.5	97.7	0.0	103.5	97.0	0.1	0.0	56.7
6/3/2011 18:00	0.0	44.4	21.0	0.2	31.6	30.0	20.3	94.0	49.8	5.5	107.1	93.1	0.0	94.1	92.5	0.1	0.0	54.1
6/3/2011 21:07	0.0	42.6	20.2	0.2	29.3	28.6	19.3	88.5	47.3	4.8	97.4	88.4	0.0	85.0	87.9	0.1	0.0	51.6
6/4/2011 0:00	0.0	40.8	19.4	0.1	26.3	27.1	18.4	82.6	45.0	4.3	89.0	84.1	0.0	76.9	83.5	0.1	0.0	48.8
6/4/2011 3:07	0.0	38.7	18.7	0.1	23.7	25.8	17.5	77.7	43.1	3.7	81.2	79.9	0.0	69.8	79.4	0.1	0.0	46.1
6/4/2011 6:00	0.0	36.4	17.9	0.1	22.6	24.9	16.7	74.0	41.2	3.2	74.7	76.2	0.0	63.2	75.4	0.1	0.0	43.4
6/4/2011 9:07	0.0	34.6	17.3	0.1	21.1	24.0	15.9	70.3	39.6	2.9	68.0	72.4	0.0	57.7	72.1	0.0	0.0	40.9
6/4/2011 12:00	0.0	33.0	16.7	0.1	19.6	23.0	15.9	67.4	38.5	2.6	62.0	68.7	0.0	52.0	68.4	0.0	0.0	38.4
6/4/2011 15:07	0.0	31.8	16.3	0.1	18.7	22.1	13.9	64.4	36.3	2.3	56.9	65.1	0.0	47.0	64.9	0.0	0.0	36.1
6/4/2011 18:00	0.0	30.5	15.8	0.1	17.4	21.3	13.4	59.2	34.8	2.0	52.5	62.0	0.0	43.0	61.7	0.0	0.0	33.9
6/4/2011 21:07	0.0	29.2	15.4	0.1	16.6	20.5	14.2	60.1	34.4	1.8	48.3	58.8	0.0	39.2	58.5	0.0	0.0	31.9
6/5/2011 0:00	0.0	28.0	15.0	0.1	15.7	19.8	13.4	55.6	32.9	1.7	44.9	56.1	0.0	35.7	55.6	0.0	0.0	30.0
6/5/2011 3:07	0.0	26.9	14.6	0.1	15.0	19.1	12.6	53.9	31.5	1.5	41.6	53.4	0.0	32.8	53.0	0.0	0.0	28.3
6/5/2011 6:00	0.0	26.0	14.2	0.1	14.5	18.7	12.3	52.1	30.6	1.3	39.5	50.9	0.0	30.4	50.5	0.0	0.0	26.6
6/5/2011 9:07	0.0	25.0	13.8	0.1	13.7	18.2	11.9	49.8	29.7	1.2	36.6	48.0	0.0	28.3	47.9	0.0	0.0	25.1
6/5/2011 12:00	0.0	24.1	13.5	0.1	13.4	17.7	11.5	47.8	28.8	1.0	34.2	45.6	0.0	25.7	45.3	0.0	0.0	23.5

ENBRIDGE

Drawn: MB 4/17/2012

Approved: JLH 4/17/2012

Project #: 106-4186

Footnotes:
Mg=Megagrams
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FLOODPLAIN SIMULATED SEDIMENT MASS FLUX (MEGAGRAMS PER DAY) IN KALAMAZOO RIVER VALIDATION

SHEET 6 OF 7

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP

Date/Time	Ceresco Dam			Kalamazoo Dam			Kalamazoo River Gauge Near Battle Creek			35th Street Bridge			MP 37.75			Morrow Lake Dam		
	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)	Sand (Mg)	Silt (Mg)	Clay (Mg)
6/5/2011 15:07	0.0	23.3	13.2	0.1	13.0	17.2	11.2	46.4	28.0	0.9	32.6	43.5	0.0	23.6	42.9	0.0	0.0	22.0
6/5/2011 18:00	0.0	22.3	12.9	0.1	12.6	16.7	10.8	45.0	27.1	0.8	31.7	41.8	0.0	22.7	41.2	0.0	0.0	20.5
6/5/2011 21:07	0.0	21.3	12.5	0.0	12.0	16.3	10.4	43.5	26.3	0.8	30.5	40.2	0.0	21.3	39.4	0.0	0.0	19.2
6/6/2011 0:00	0.0	20.4	12.3	0.0	11.8	15.9	10.2	42.2	25.6	0.7	29.1	38.7	0.0	20.2	37.9	0.0	0.0	18.0
6/6/2011 3:07	0.0	19.4	11.9	0.0	11.3	15.5	9.9	40.8	25.0	0.6	27.2	37.5	0.0	18.9	36.6	0.0	0.0	16.9
6/6/2011 6:00	0.0	18.5	11.6	0.0	10.7	15.0	9.4	39.2	24.2	0.5	26.2	36.4	0.0	17.6	35.4	0.0	0.0	15.9
6/6/2011 9:07	0.0	17.6	11.3	0.0	10.2	14.7	9.1	37.8	23.5	0.5	25.4	35.2	0.0	16.7	34.3	0.0	0.0	14.9
6/6/2011 12:00	0.0	16.9	11.0	0.0	9.8	14.2	8.7	36.6	22.8	0.5	24.5	34.1	0.0	16.1	33.1	0.0	0.0	14.0
6/6/2011 15:07	0.0	16.1	10.7	0.0	9.3	13.9	8.4	35.3	22.2	0.4	23.8	33.3	0.0	15.4	32.2	0.0	0.0	13.3
6/6/2011 18:00	0.0	15.3	10.4	0.0	8.6	13.4	8.2	33.8	21.5	0.4	23.1	32.5	0.0	14.9	31.4	0.0	0.0	12.6
6/6/2011 21:07	0.0	14.6	10.2	0.0	8.1	12.9	7.8	32.5	20.7	0.4	22.4	31.7	0.0	14.3	30.6	0.0	0.0	12.0
6/7/2011 0:00	0.0	14.0	9.9	0.0	7.8	12.5	7.6	31.4	20.2	0.4	21.7	30.8	0.0	13.7	29.8	0.0	0.0	11.5
6/7/2011 3:07	0.0	13.4	9.7	0.0	7.2	12.1	7.1	30.1	19.4	0.3	21.0	30.1	0.0	13.0	28.9	0.0	0.0	11.0
6/7/2011 6:00	0.0	12.6	9.4	0.0	6.7	11.7	6.9	29.4	19.0	0.3	20.6	29.3	0.0	12.5	28.2	0.0	0.0	10.6
6/7/2011 9:07	0.0	12.0	9.2	0.0	6.3	11.2	6.6	28.5	18.4	0.3	20.2	28.6	0.0	12.0	27.4	0.0	0.0	10.1
6/7/2011 12:00	0.0	11.5	9.0	0.0	5.9	10.9	6.4	27.6	17.9	0.3	19.6	27.8	0.0	11.5	26.6	0.0	0.0	9.7
6/7/2011 15:07	0.0	11.0	8.8	0.0	5.6	10.6	6.2	26.9	17.4	0.2	19.1	27.0	0.0	11.0	25.9	0.0	0.0	9.3
6/7/2011 18:00	0.0	10.6	8.7	0.0	5.4	10.3	5.9	25.6	16.9	0.2	18.7	26.3	0.0	10.5	25.1	0.0	0.0	8.9
6/7/2011 21:07	0.0	10.2	8.5	0.0	5.1	10.1	5.8	25.1	16.5	0.2	18.3	25.7	0.0	10.1	24.5	0.0	0.0	8.5
6/8/2011 0:00	0.0	10.0	8.4	0.0	5.0	10.0	5.7	24.3	16.2	0.2	18.0	25.0	0.0	9.7	23.9	0.0	0.0	8.1
6/8/2011 3:07	0.0	9.6	8.3	0.0	4.8	9.8	5.6	23.8	15.9	0.1	17.7	24.4	0.0	9.3	23.2	0.0	0.0	7.8
6/8/2011 6:00	0.0	9.2	8.1	0.0	4.6	9.7	5.4	22.9	15.6	0.1	17.4	23.8	0.0	8.9	22.5	0.0	0.0	7.4
6/8/2011 9:07	0.0	8.9	8.0	0.0	4.5	9.7	5.3	22.1	15.3	0.1	17.1	23.4	0.0	8.6	21.9	0.0	0.0	7.1
6/8/2011 12:00	0.0	8.5	7.8	0.0	4.3	9.6	5.2	21.4	15.1	0.1	16.8	22.9	0.0	8.2	21.4	0.0	0.0	6.8
6/8/2011 15:07	0.0	8.1	7.6	0.0	4.1	9.4	5.1	20.9	14.9	0.1	16.6	22.4	0.0	7.9	20.9	0.0	0.0	6.4
6/8/2011 18:00	0.0	7.9	7.5	0.0	3.9	9.2	4.9	20.3	14.5	0.0	16.5	22.0	0.0	7.6	20.5	0.0	0.0	6.1
6/8/2011 21:07	0.0	7.9	7.5	0.0	3.8	9.1	4.9	19.8	14.3	0.0	16.3	21.6	0.0	7.4	20.1	0.0	0.0	5.9
6/9/2011 0:00	0.0	8.0	7.4	0.0	3.7	9.0	4.9	19.6	14.1	0.0	16.1	21.2	0.0	7.2	19.7	0.0	0.0	5.6

ENBRIDGE

Drawn: MB 4/17/2012

Approved: JLH 4/17/2012

Project #: 106-4186

Footnotes:
Mg=Megagrams
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FLOODPLAIN SIMULATED SEDIMENT MASS FLUX (MEGAGRAMS PER DAY) IN KALAMAZOO RIVER VALIDATION

SHEET 7 OF 7

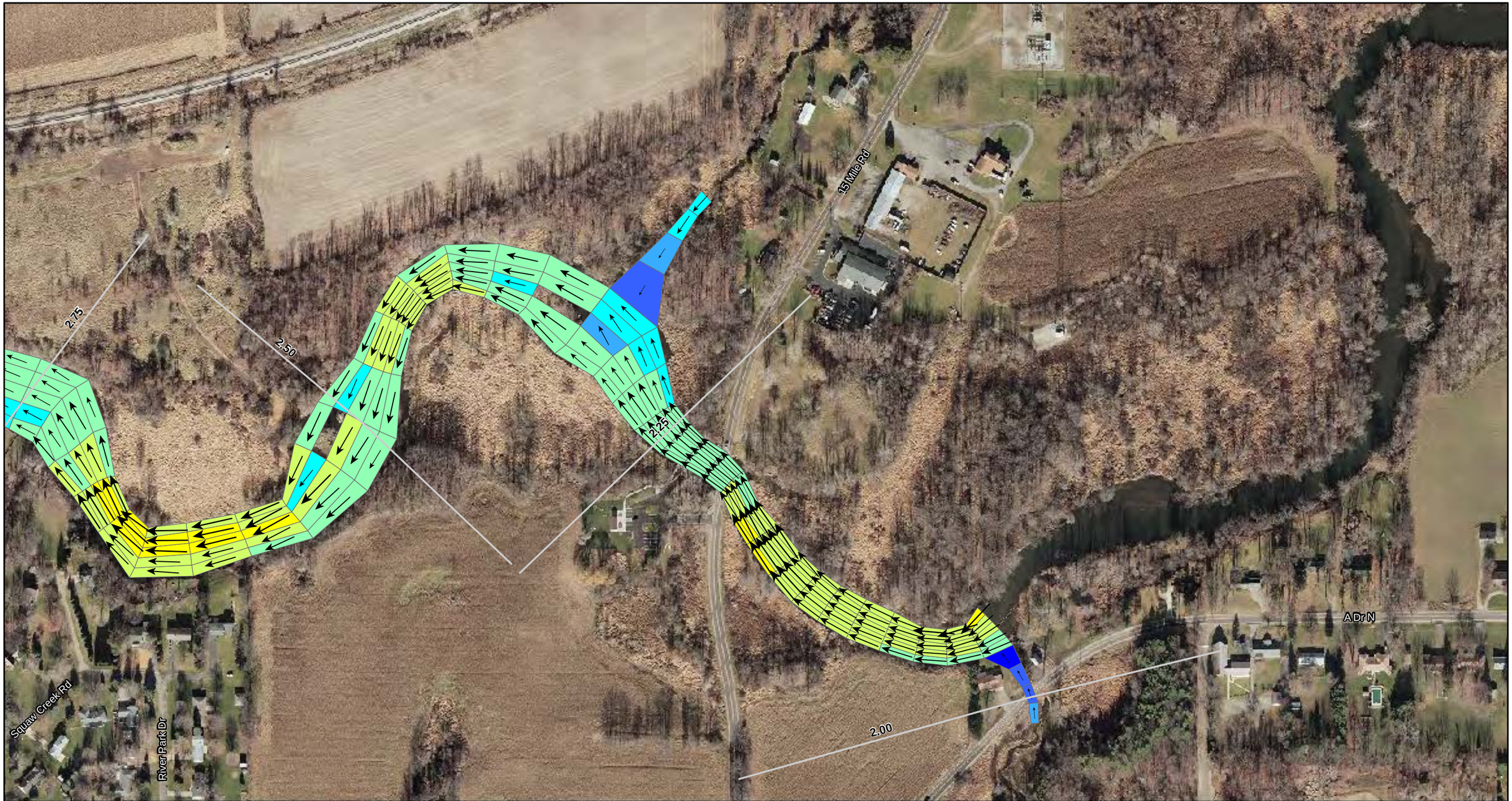
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP

Figure 5-7

Riverine Grid: Velocity

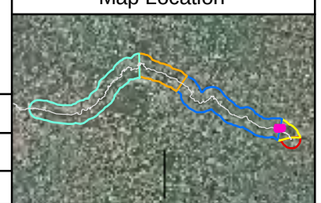
May 20, 2011

Sheets 1 through 56



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

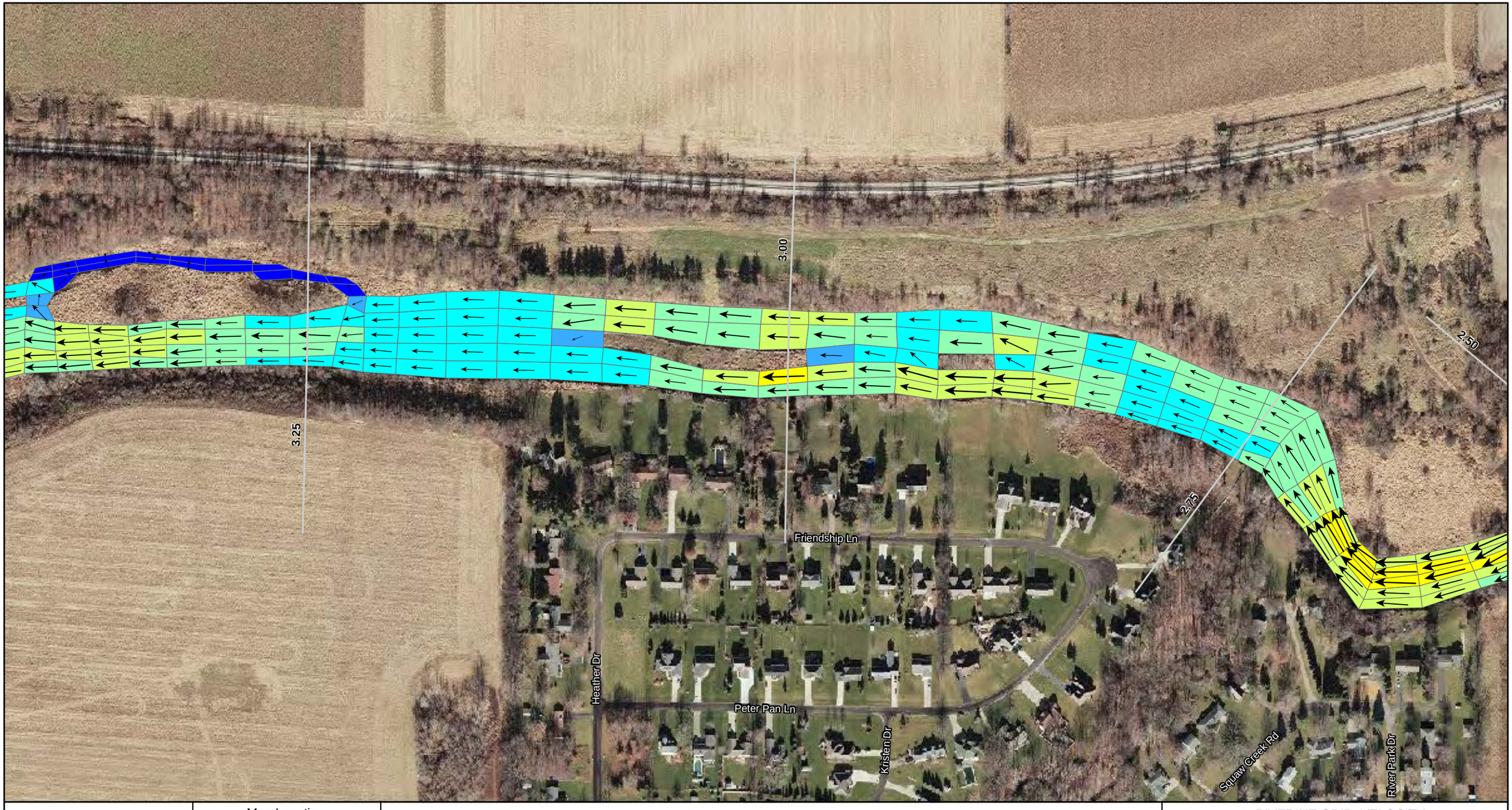
MP 01.95 - MP 02.75

SHEET 1 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May20_2011.mxd

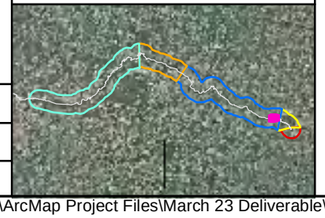
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

MP 02.60 - MP 03.40

SHEET 2 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May20_2011.mxd

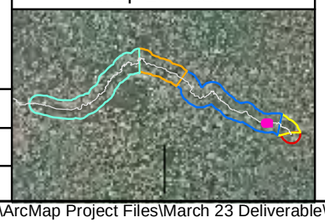
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

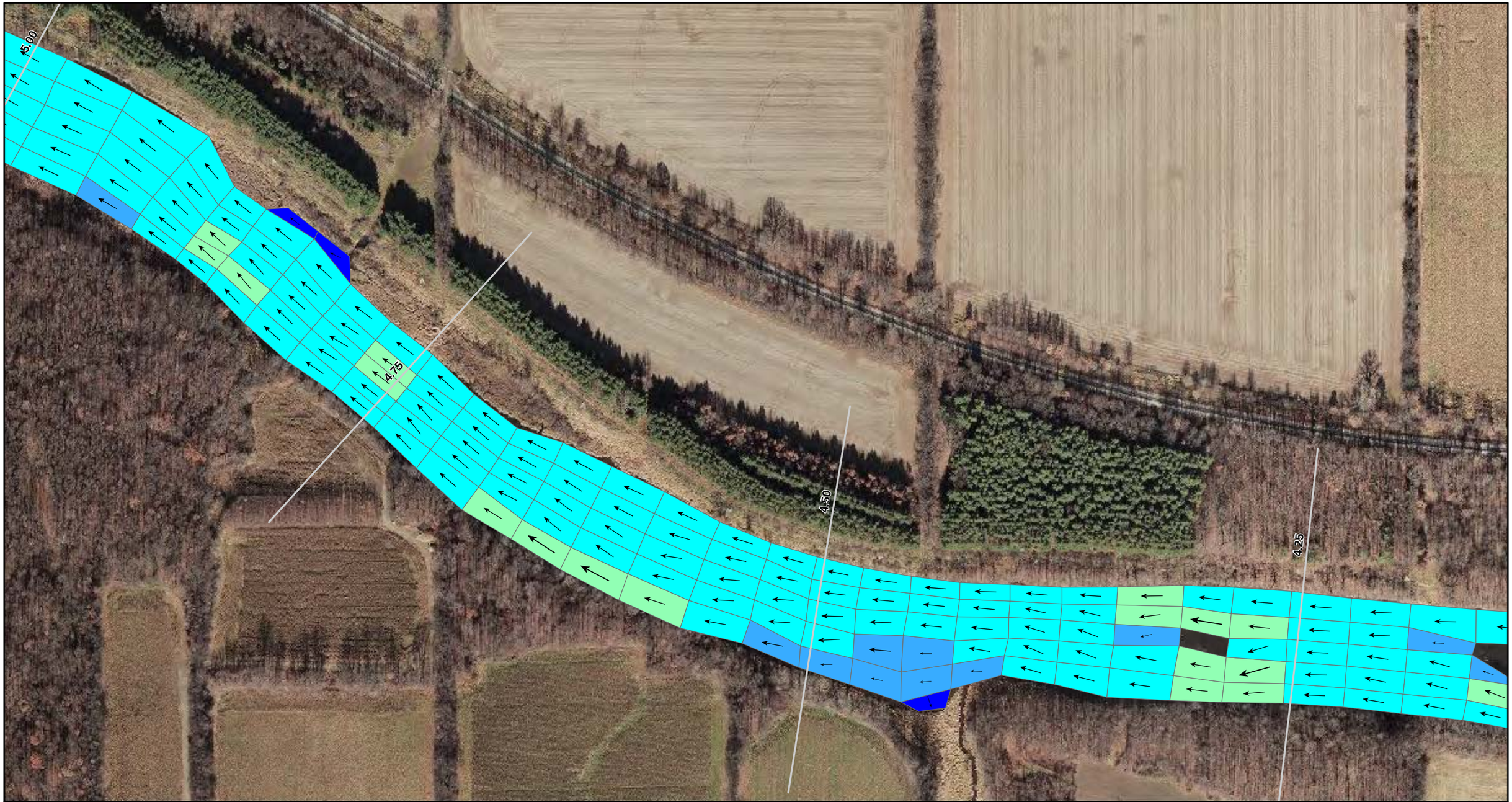
MP 03.40 - MP 04.20

SHEET 3 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May20_2011.mxd

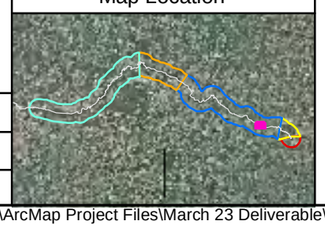
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

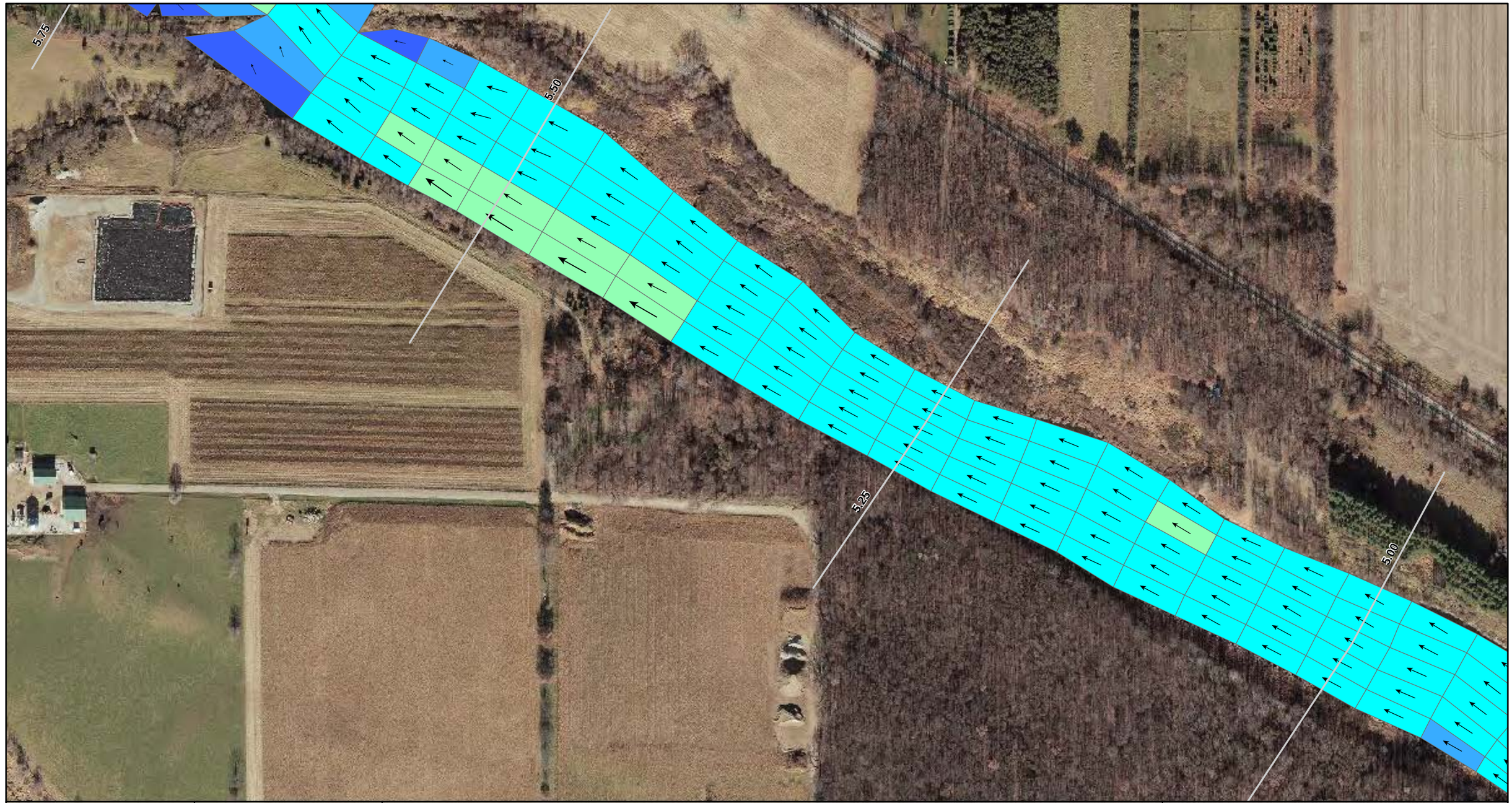
MP 04.15 - MP 05.00

SHEET 4 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May20_2011.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

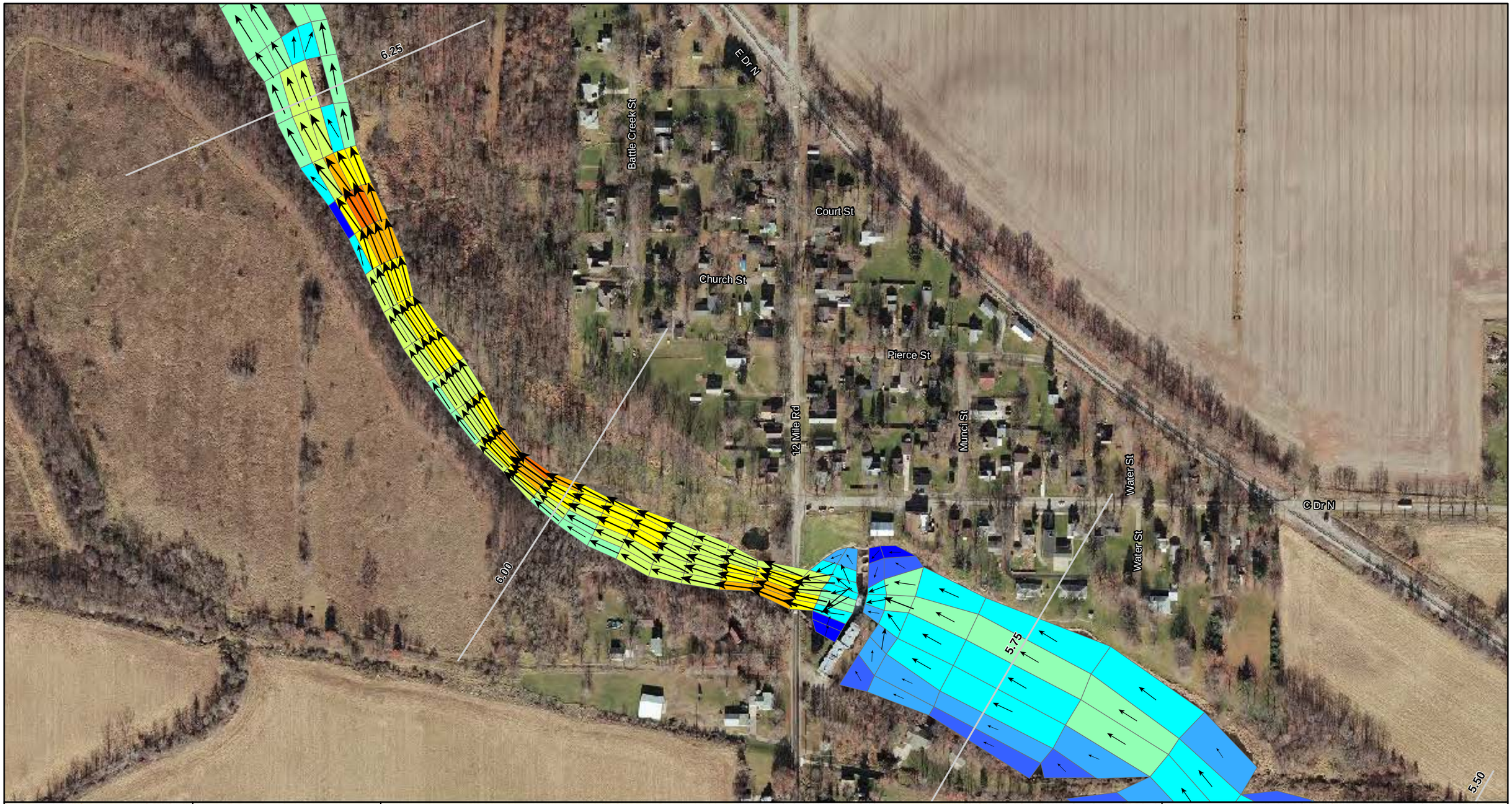
MP 04.90 - MP 05.65

SHEET 5 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May20_2011.mxd

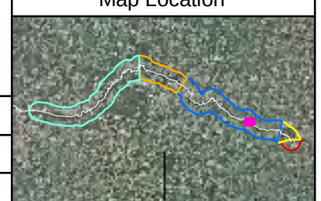
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

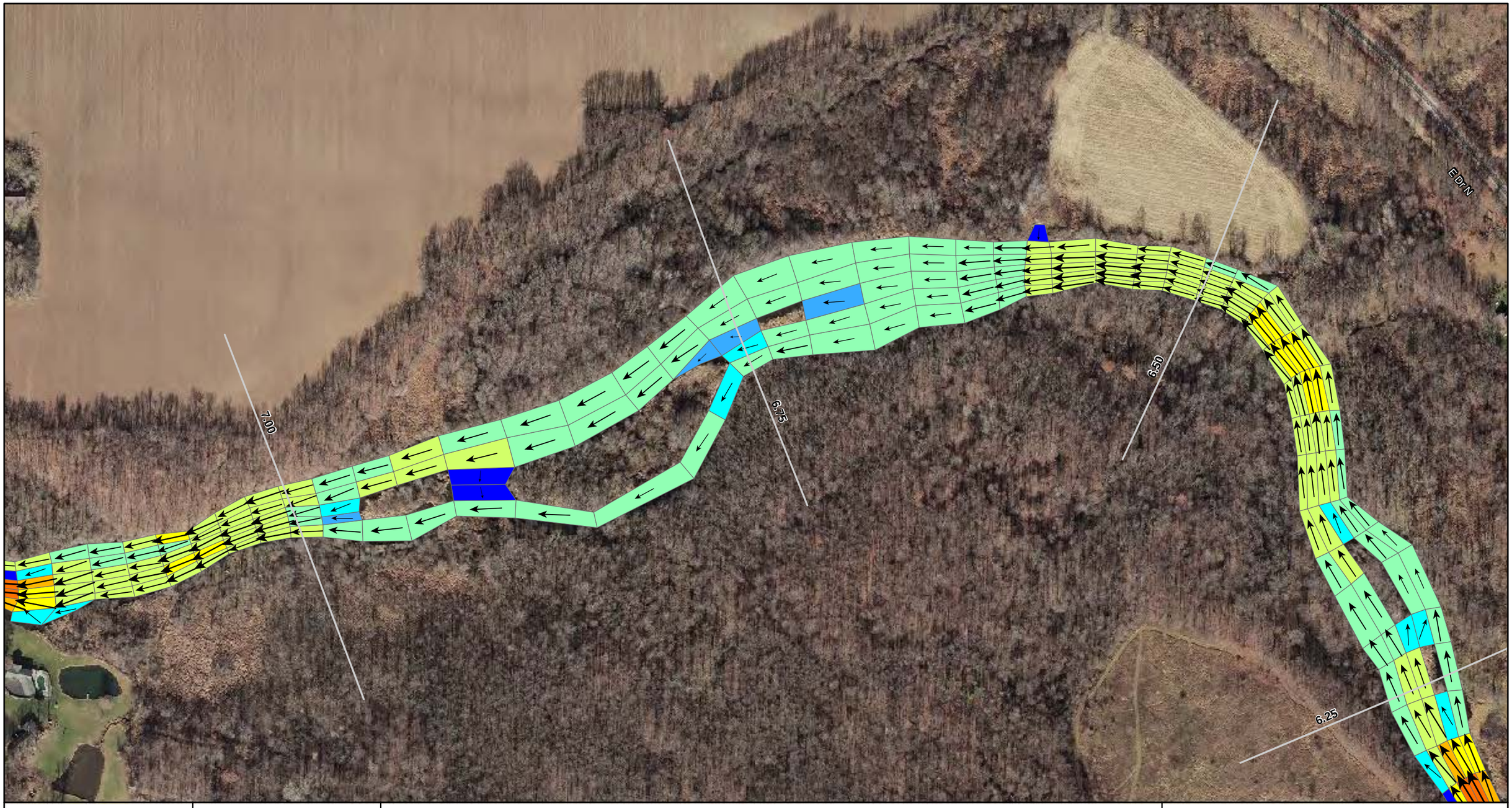
MP 05.65 - MP 06.30

SHEET 6 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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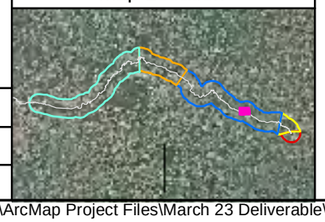
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

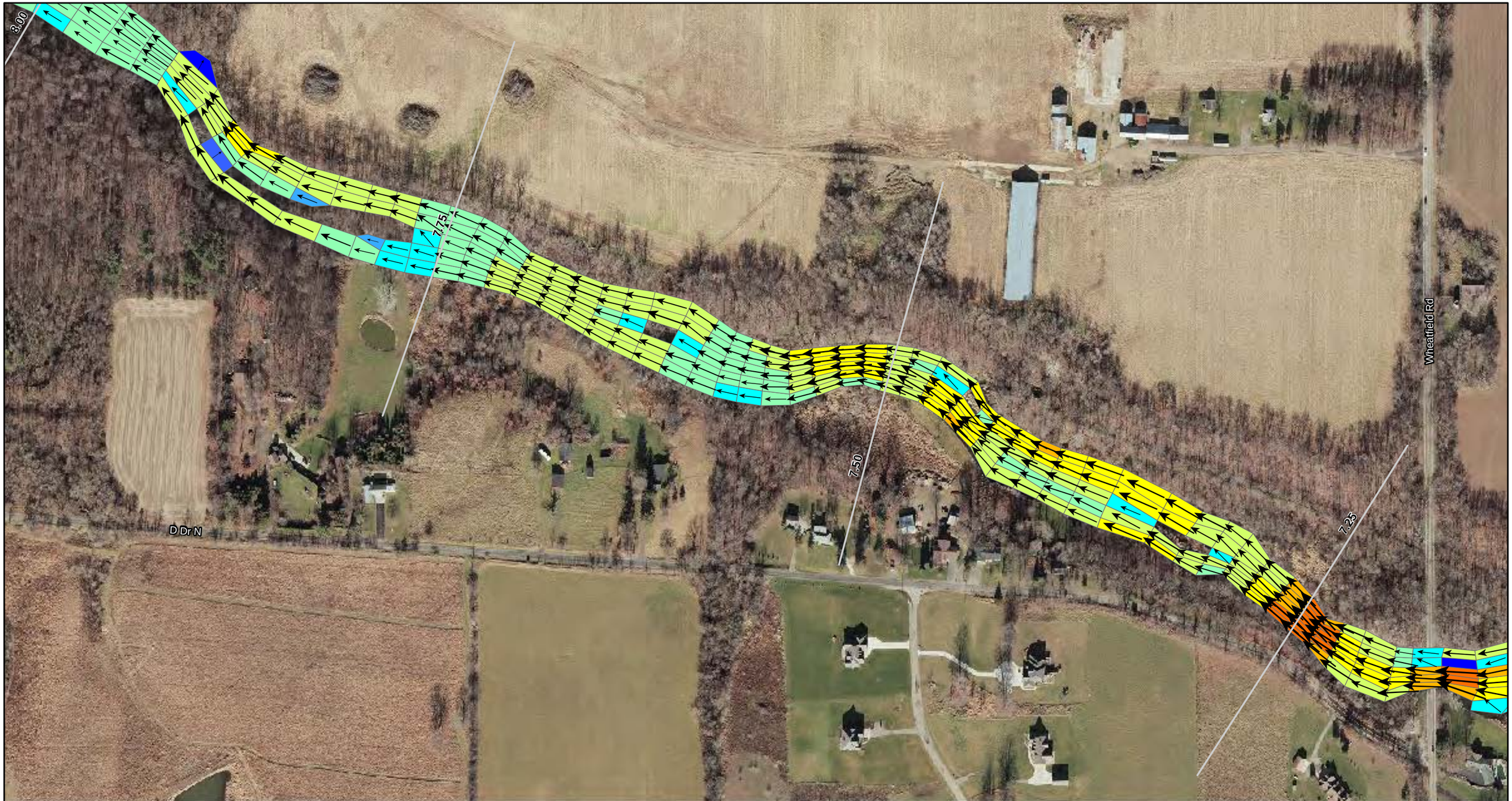
MP 06.20 - MP 07.15

SHEET 7 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

MP 07.15 - MP 07.95

SHEET 8 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

8.75

8.50

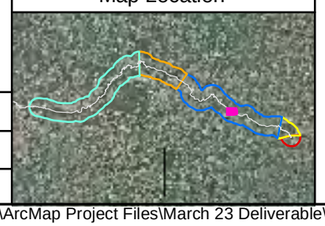
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8.00

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

MP 07.90 - MP 08.75

SHEET 9 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

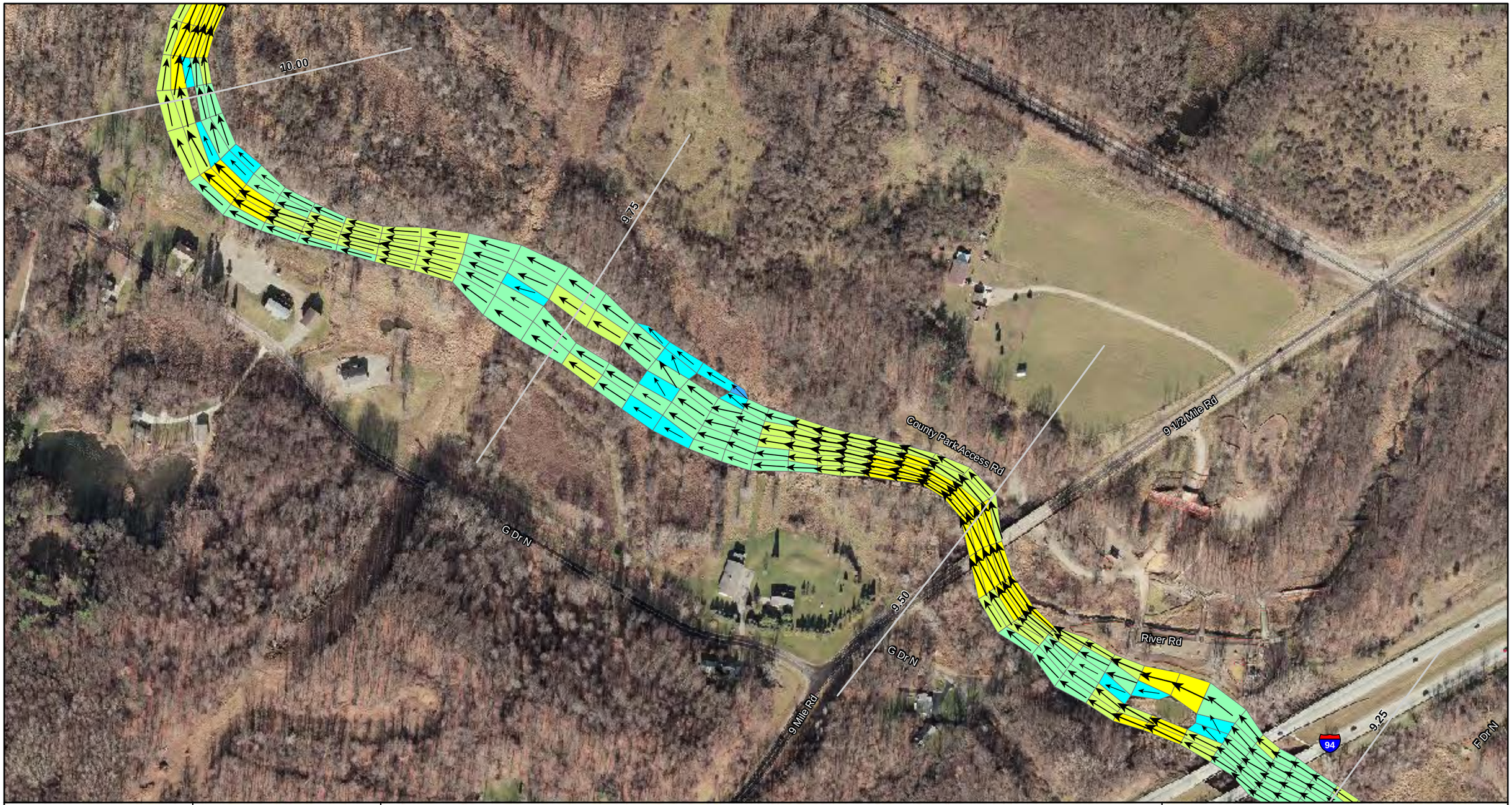
MP 07.90 - MP 08.75

SHEET 10 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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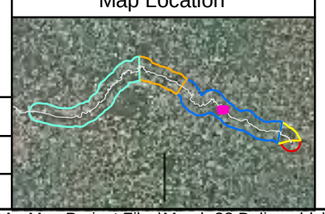
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

MP 09.25 - MP 10.05

SHEET 11 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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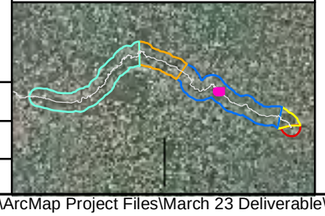
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

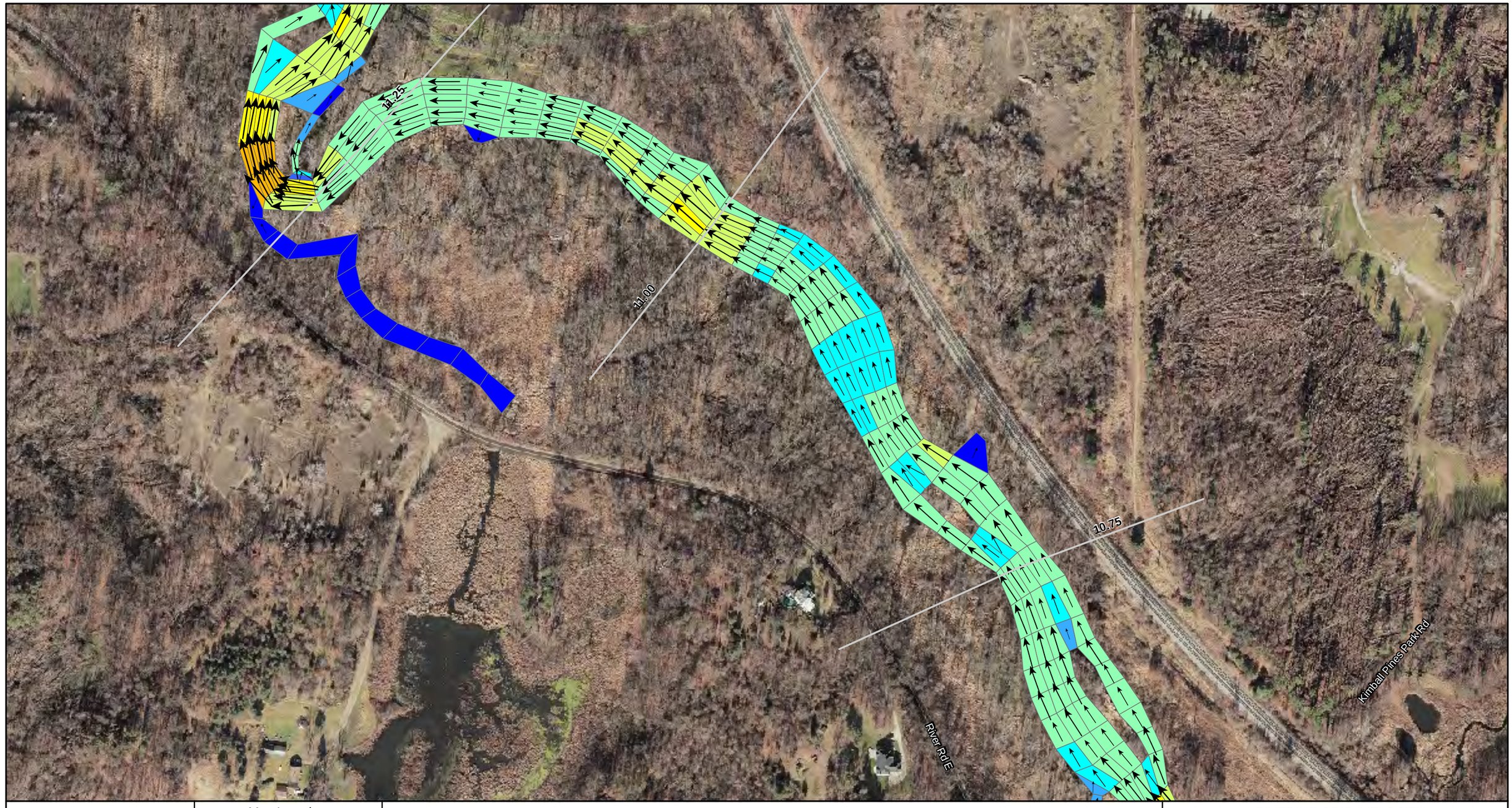
MP 10.00 - MP 10.65

SHEET 12 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

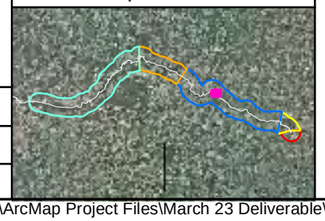
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Aerial Photography Date: November 2011



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

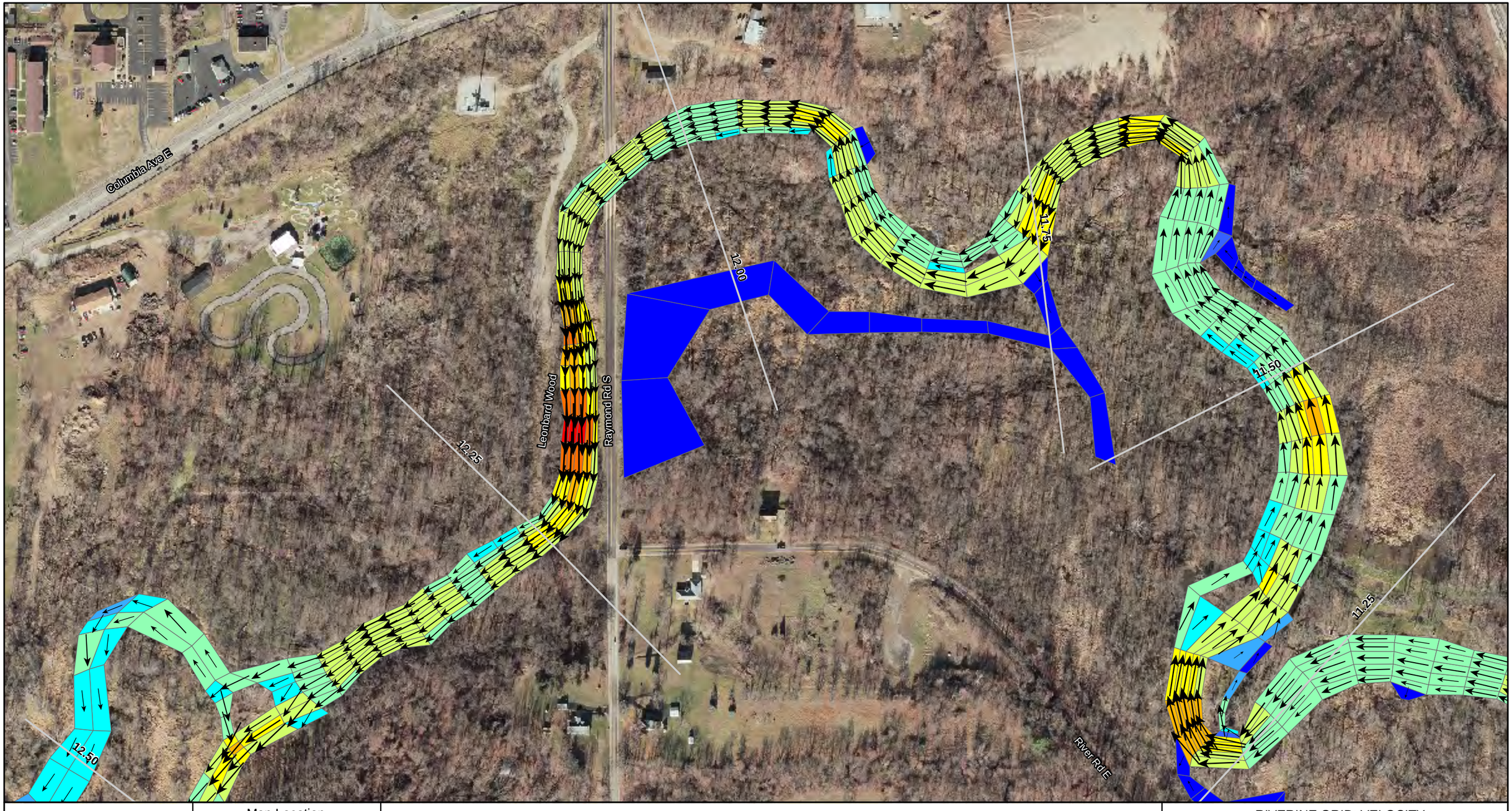
MP 10.60 - MP 11.40

SHEET 13 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May20_2011.mxd

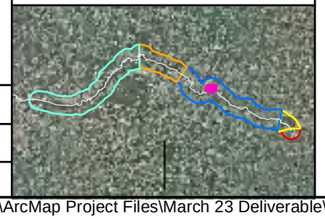
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

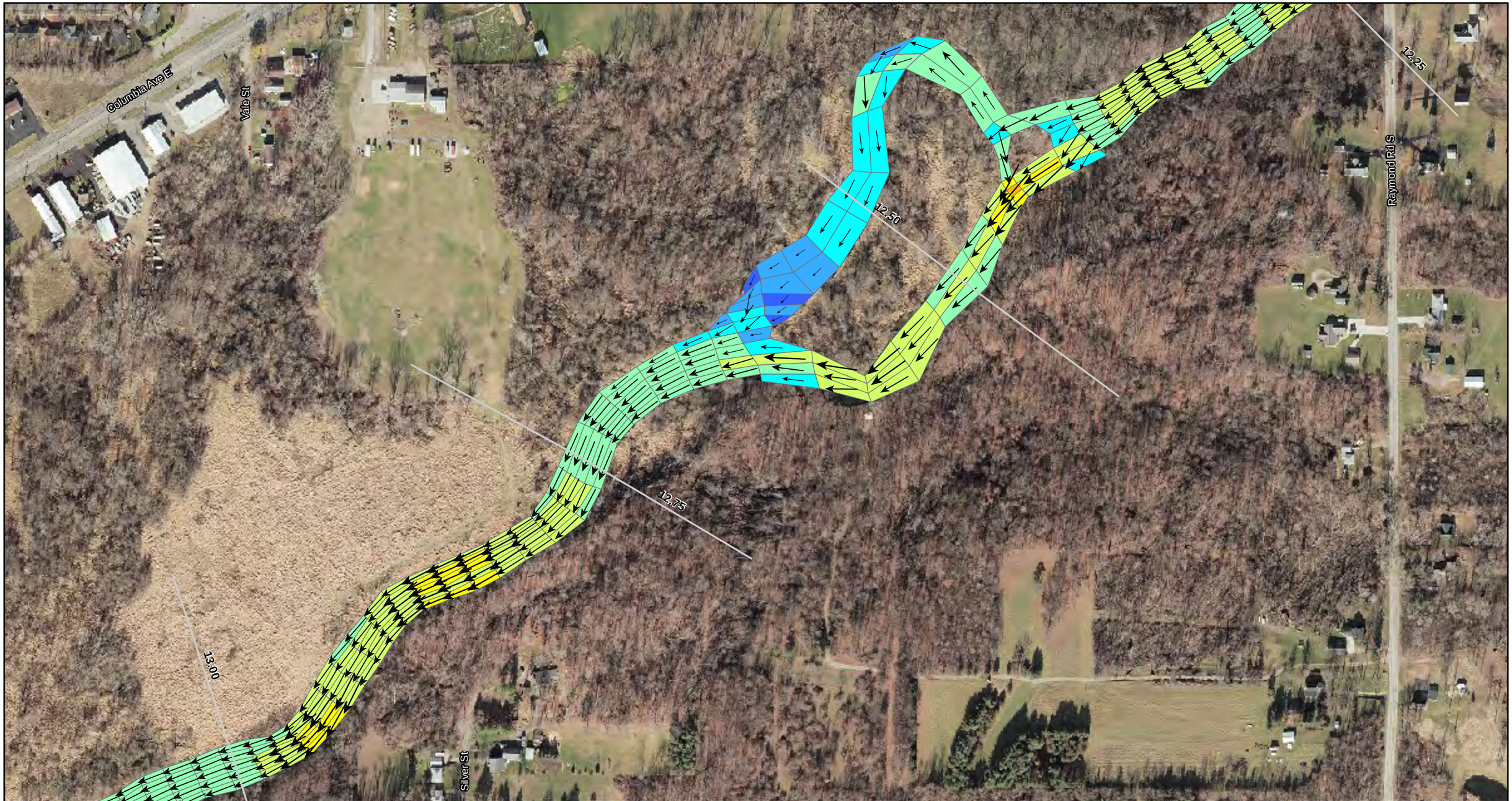
MP 11.10 - MP 12.45

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ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

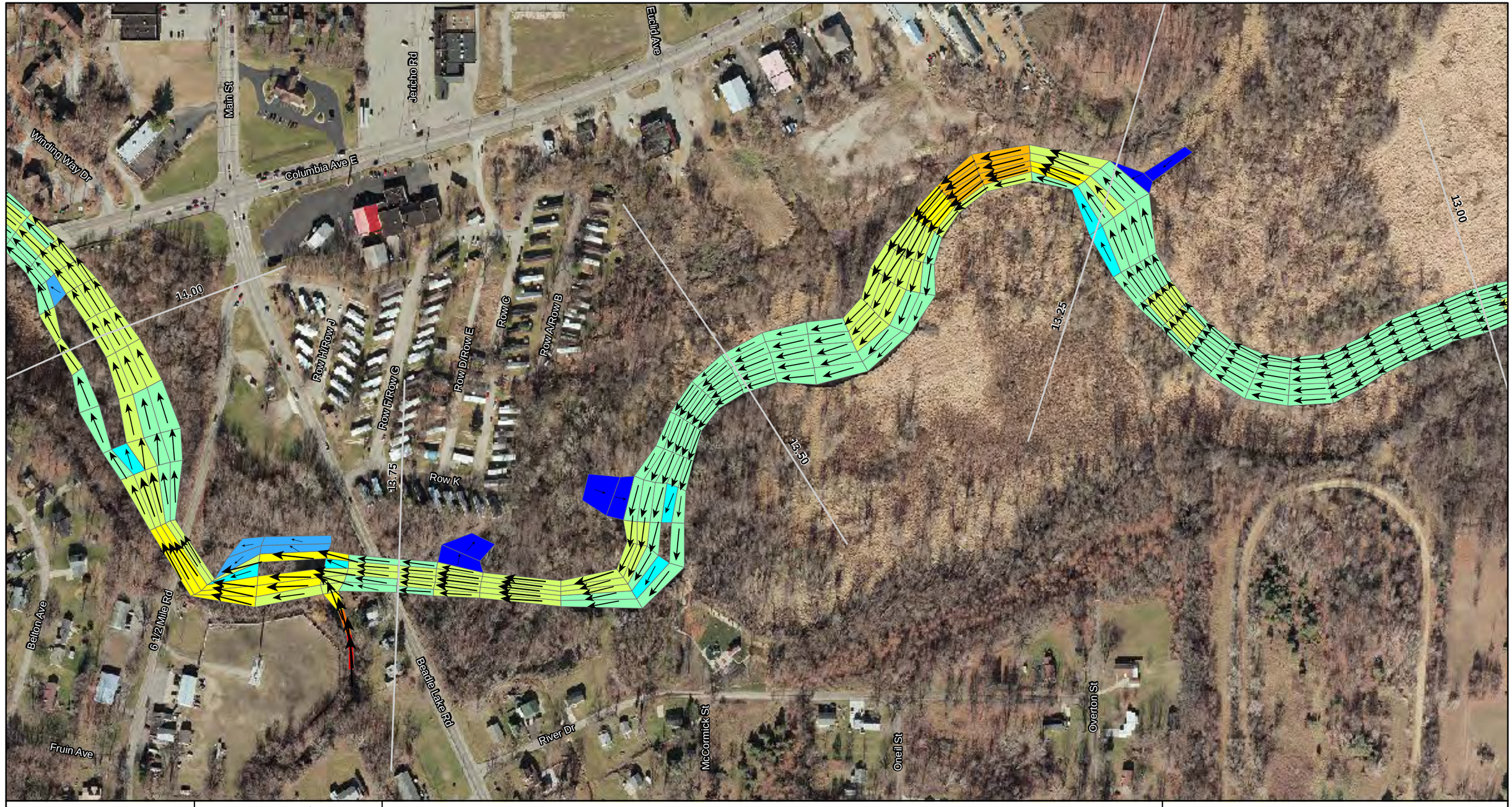
MP 12.30 - MP 13.05

SHEET 15 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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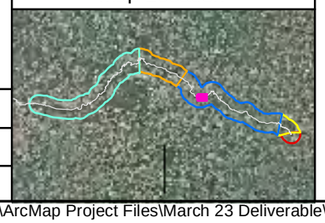
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

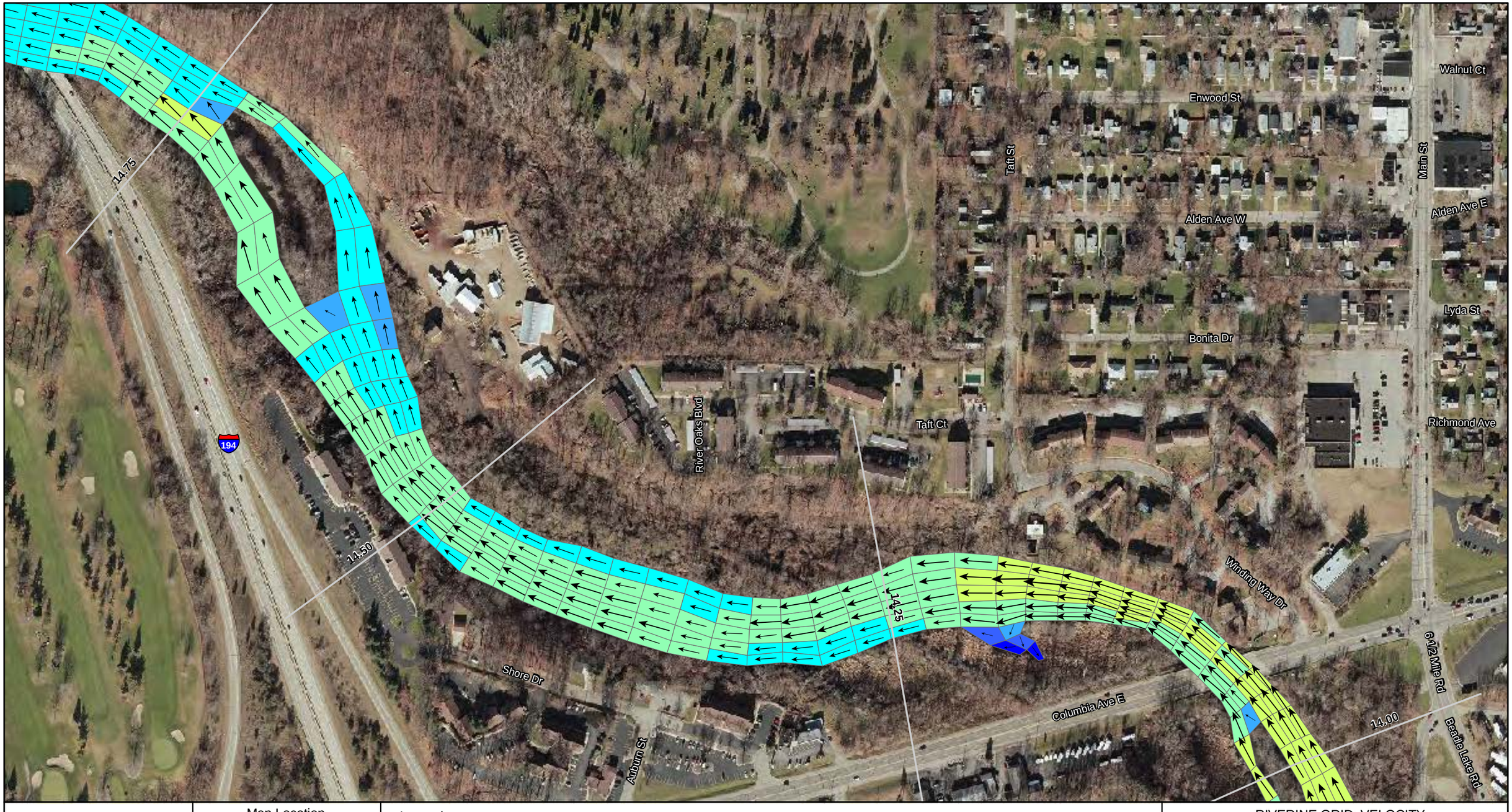
MP 13.00 - MP 14.10

SHEET 16 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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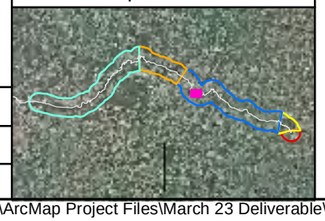
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

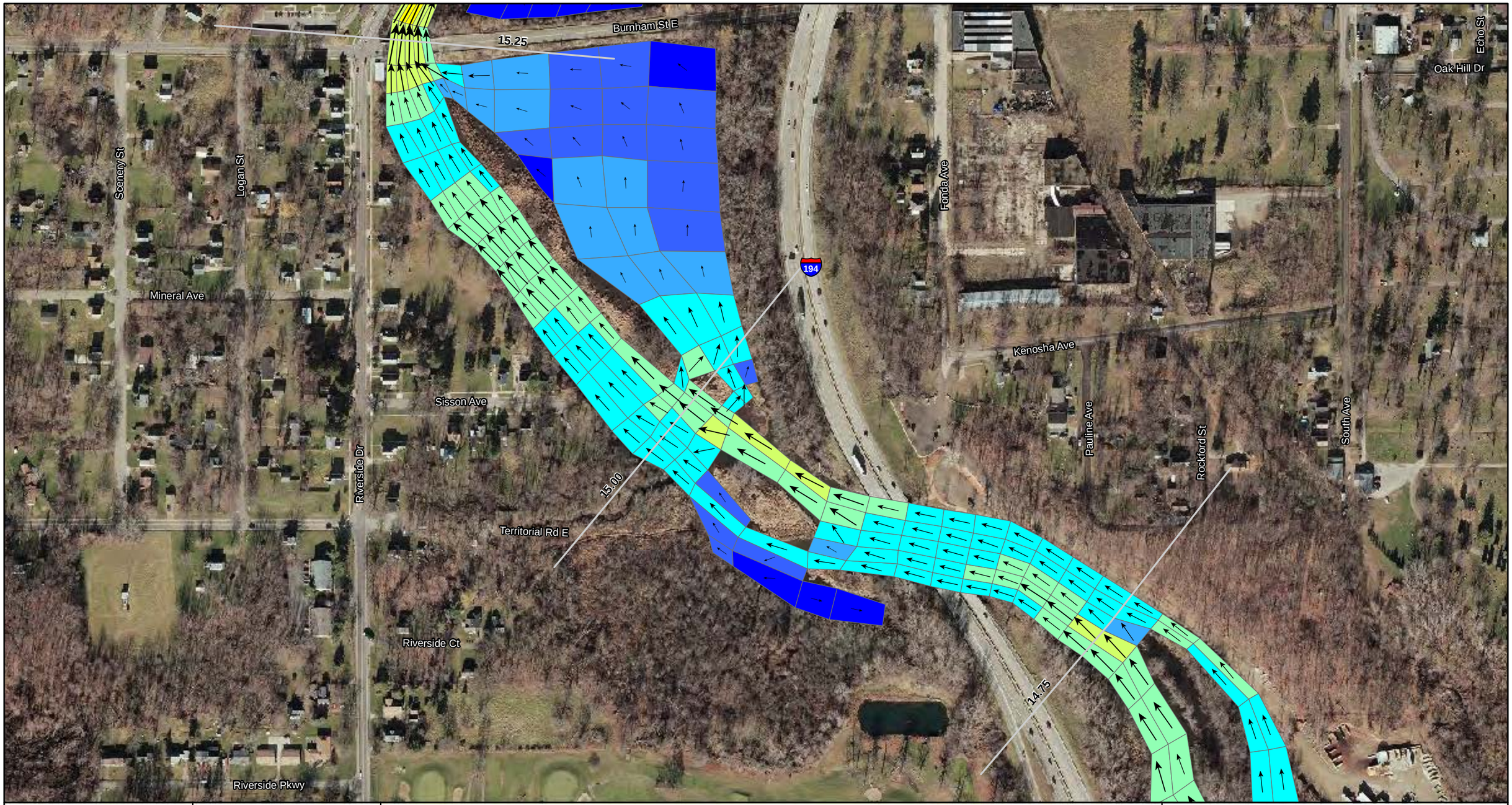
MP 14.00 - MP 14.85

SHEET 17 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May20_2011.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

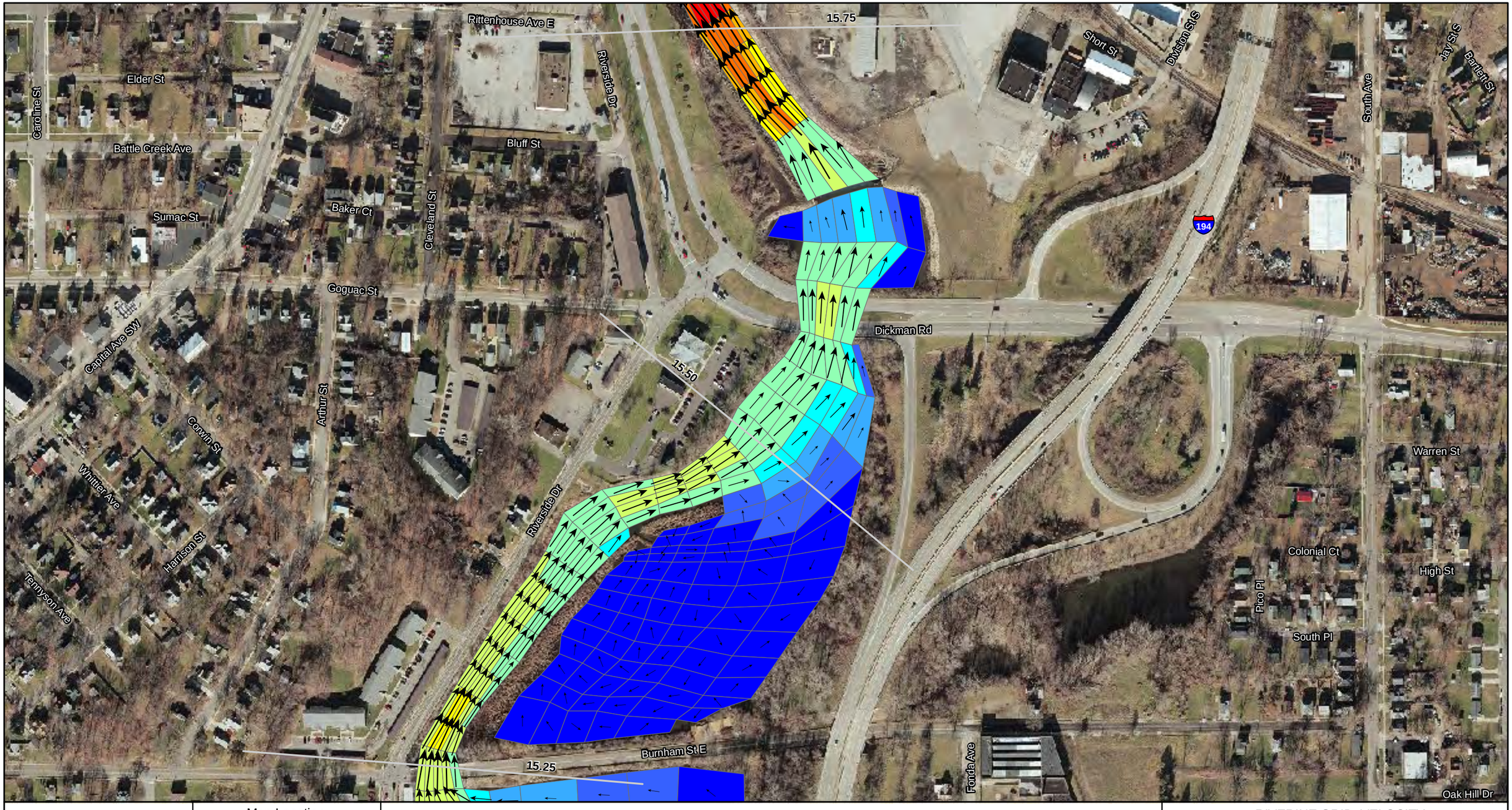
MP 14.65 - MP 15.25

SHEET 18 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May20_2011.mxd

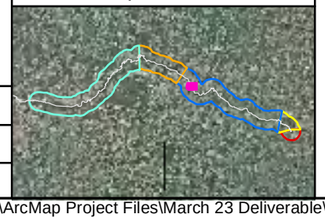
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

MP 15.25 - MP 15.75

SHEET 19 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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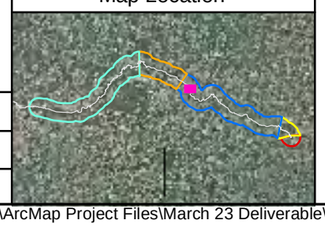
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

MP 15.75 - MP 16.30

SHEET 20 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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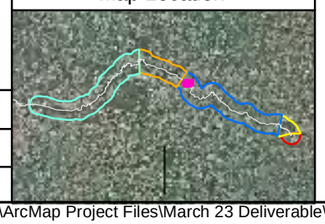
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

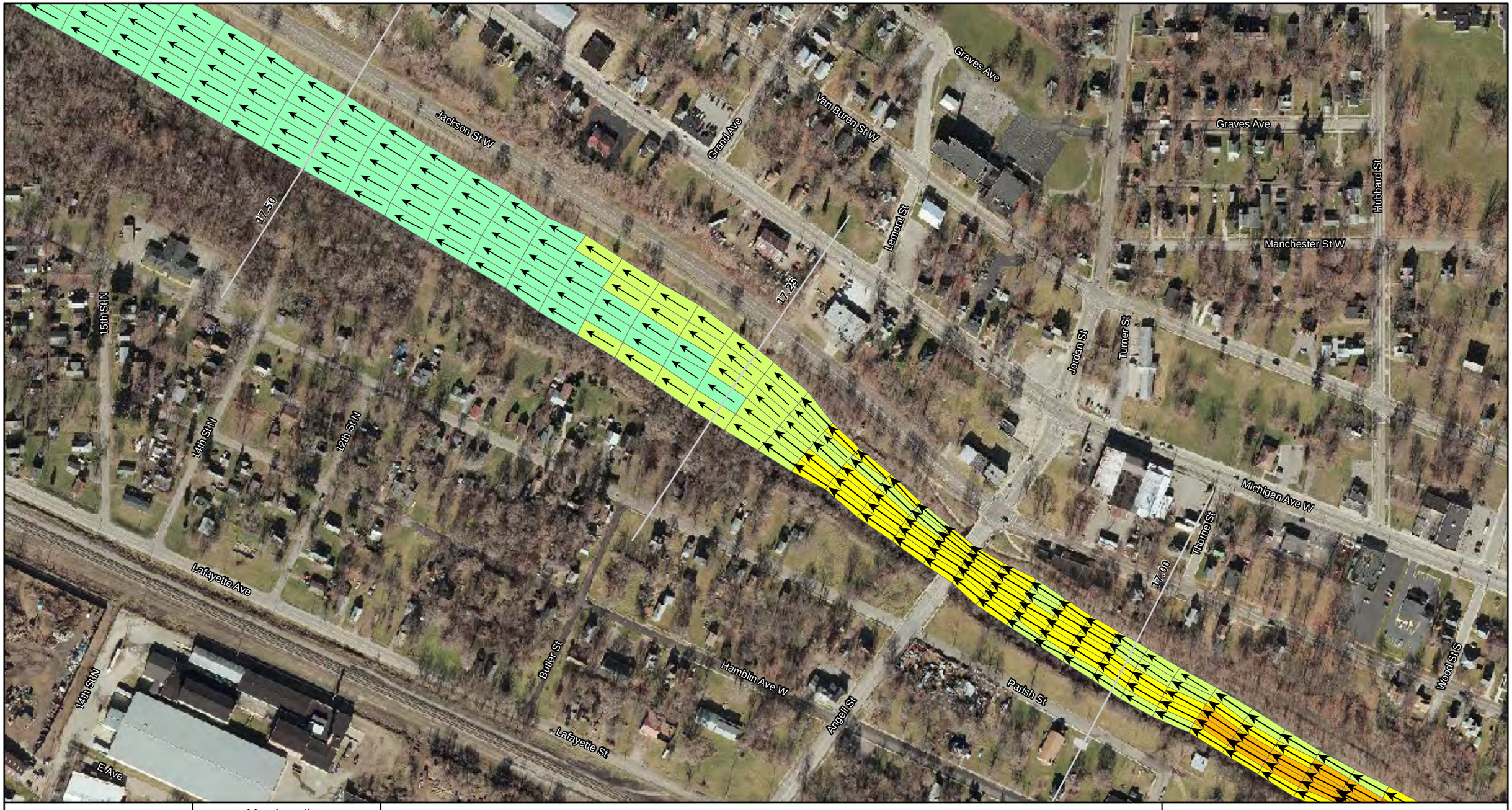
MP 16.30 - MP 16.95

SHEET 21 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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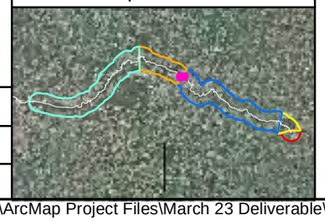
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

MP 16.85 - MP 17.60

SHEET 22 OF 56

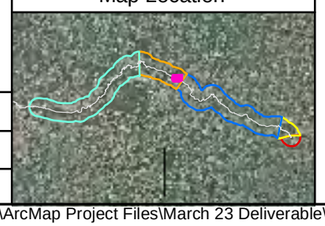
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

RIVERINE GRID: VELOCITY
MAY 20, 2011

MP 17.60 - MP 18.40

SHEET 23 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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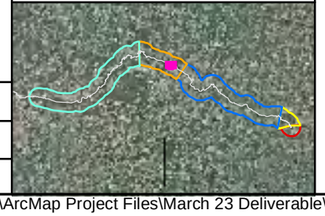
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

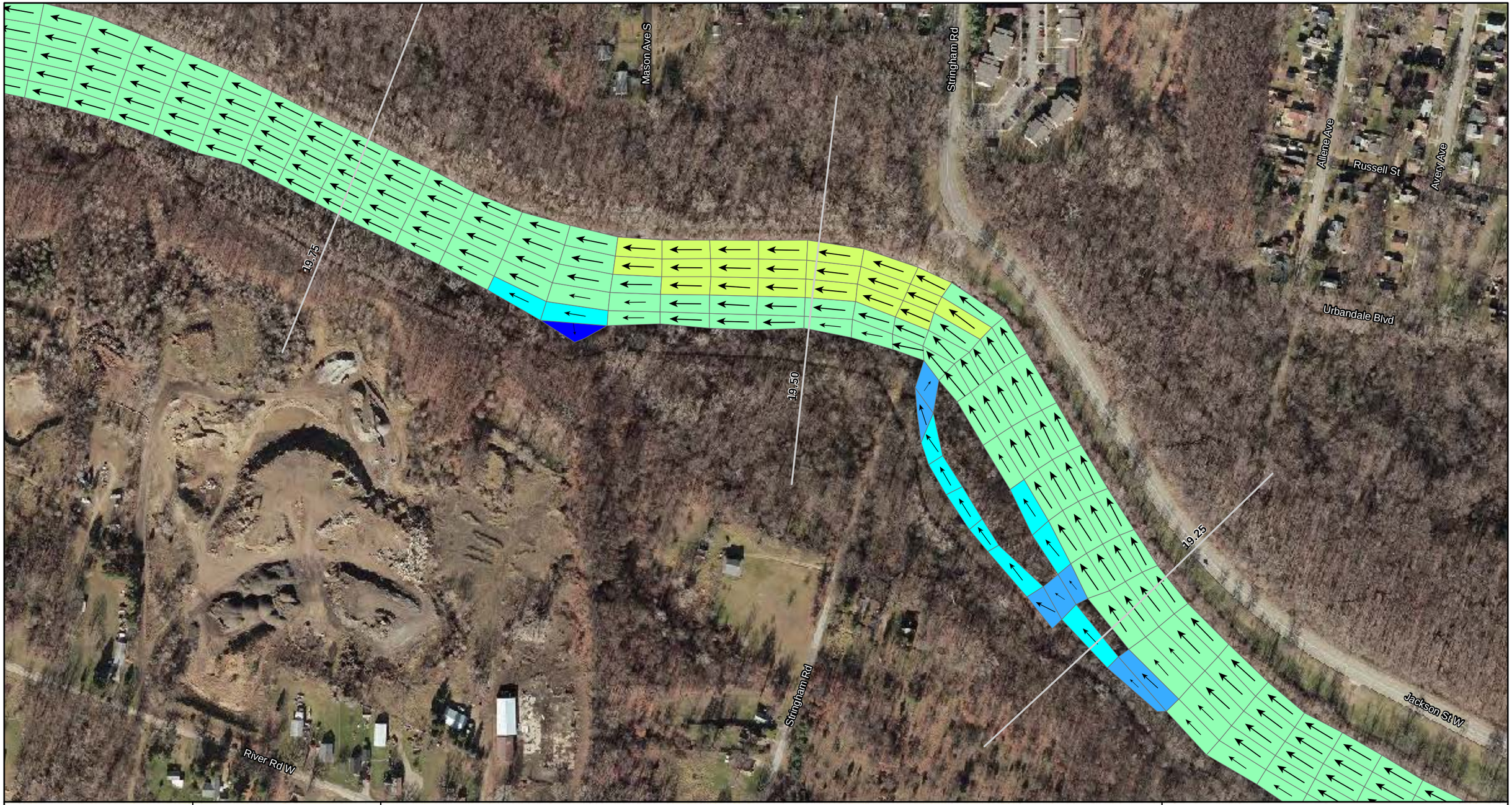
MP 18.30 - MP 19.15

SHEET 24 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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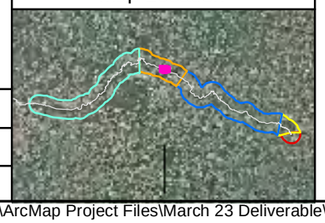
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

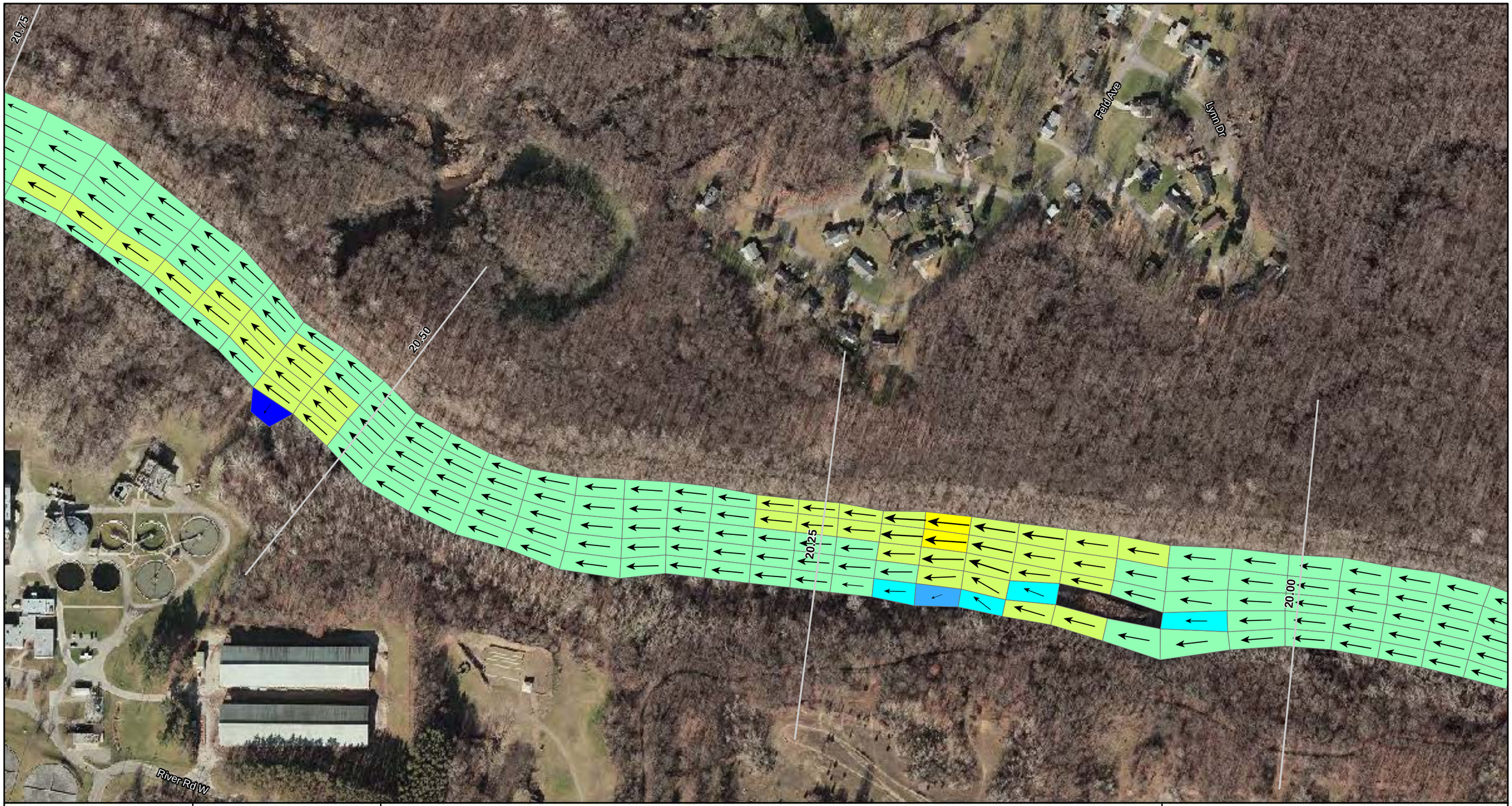
MP 19.10 - MP 19.95

SHEET 25 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May20_2011.mxd

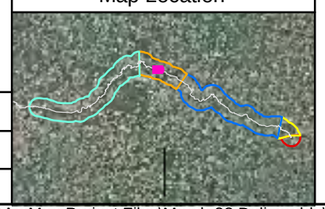
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

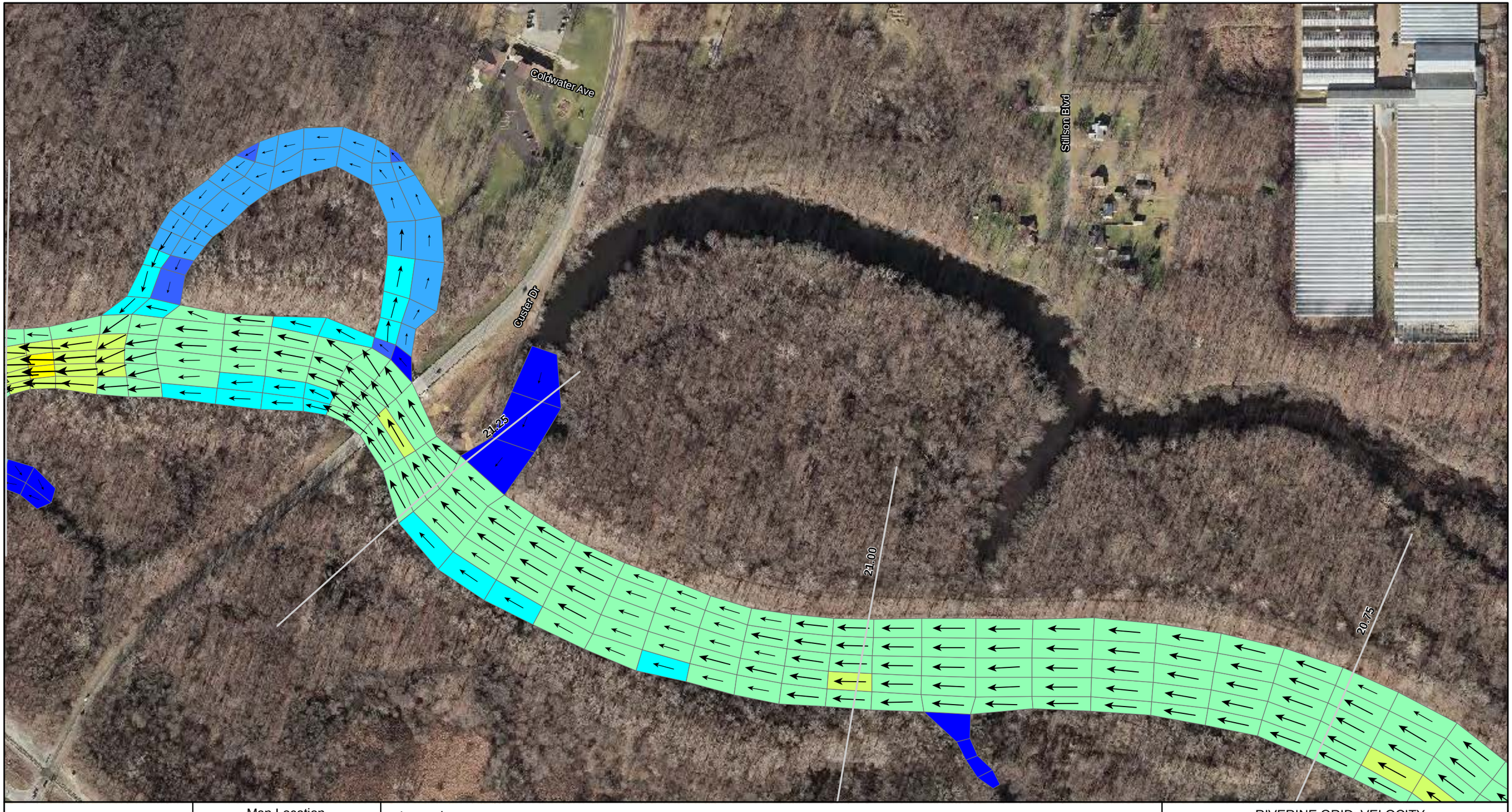
MP 19.90 - MP 20.75

SHEET 26 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May20_2011.mxd

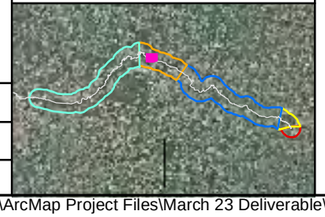
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

MP 20.70 - MP 21.50

SHEET 27 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

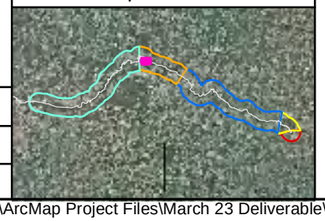
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May20_2011.mxd

Aerial Photography Date: November 2011



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

MP 21.35 - MP 22.15

SHEET 28 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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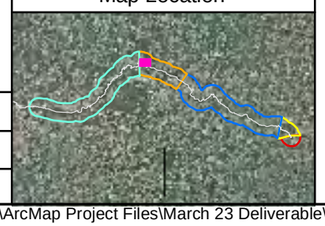
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

MP 22.15 - MP 22.90

SHEET 29 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

San Juan Ave
Colorado St
Charleston Ave
Kalamazoo Ave
23.25
23.50
23.00
23.75
24.00

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

MP 22.80 - MP 24.10

SHEET 30 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

MP 24.10 - MP 24.85

SHEET 31 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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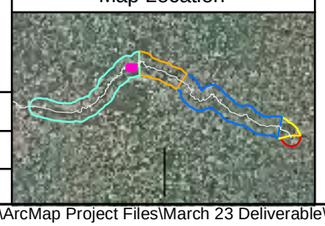
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

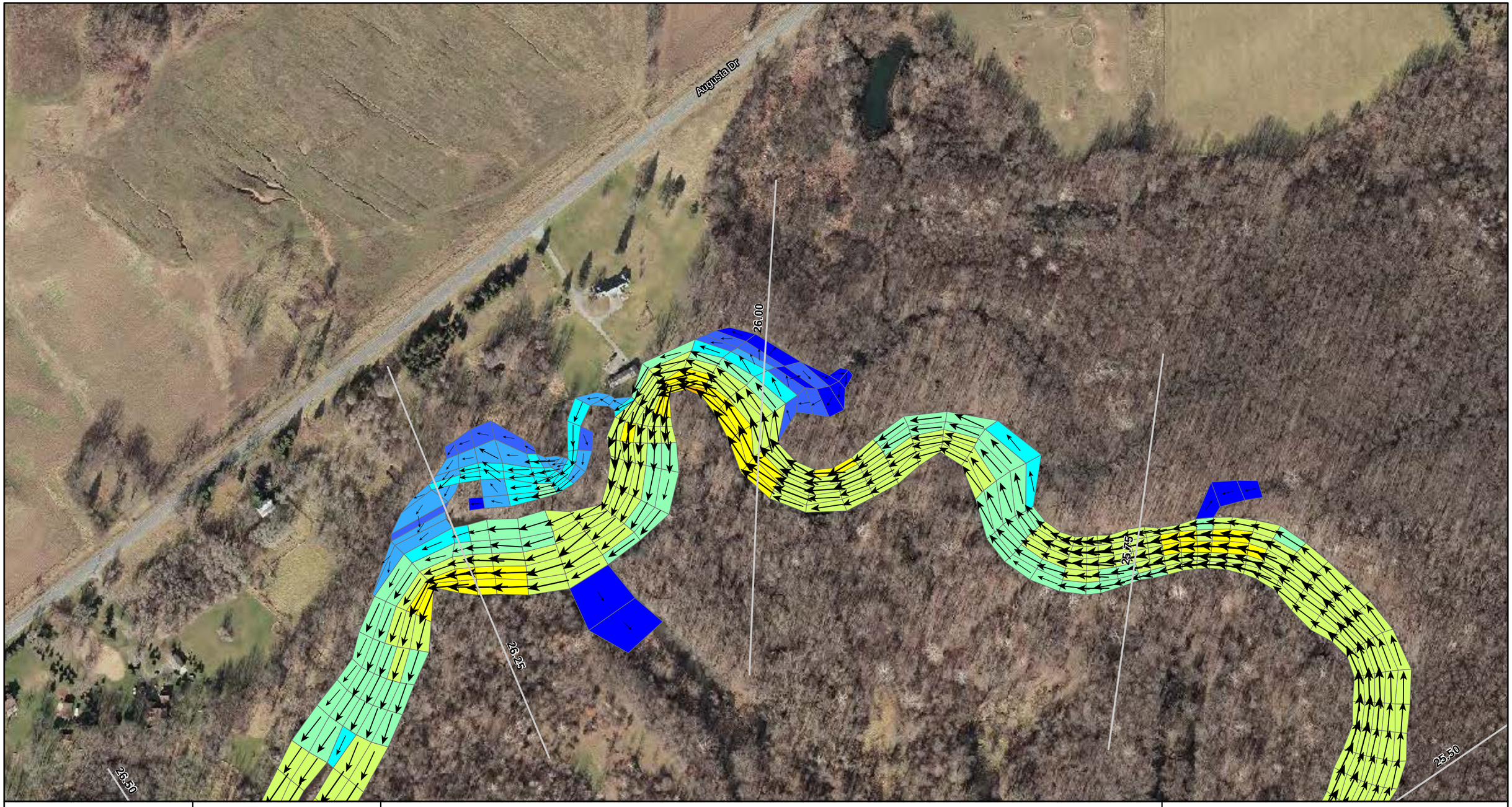
MP 24.80 - MP 25.65

SHEET 32 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

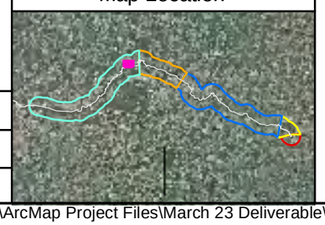
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May20_2011.mxd

Aerial Photography Date: November 2011



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

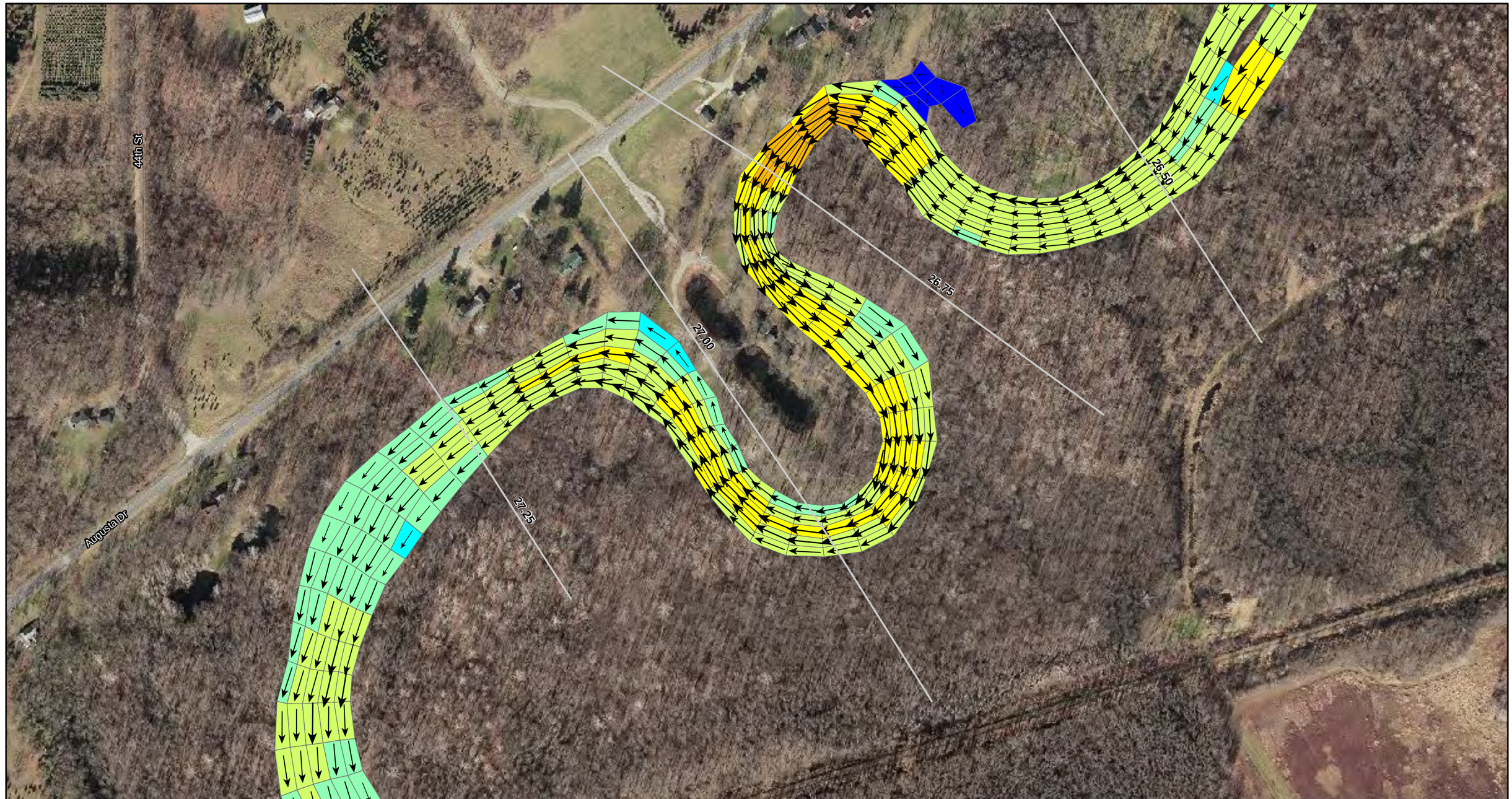
MP 25.55 - MP 26.40

SHEET 33 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

MP 26.40 - MP 27.45

SHEET 34 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

Augusta Dr

27.50

27.75

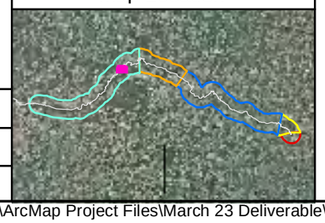
28.00

Fort Custer Dr

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

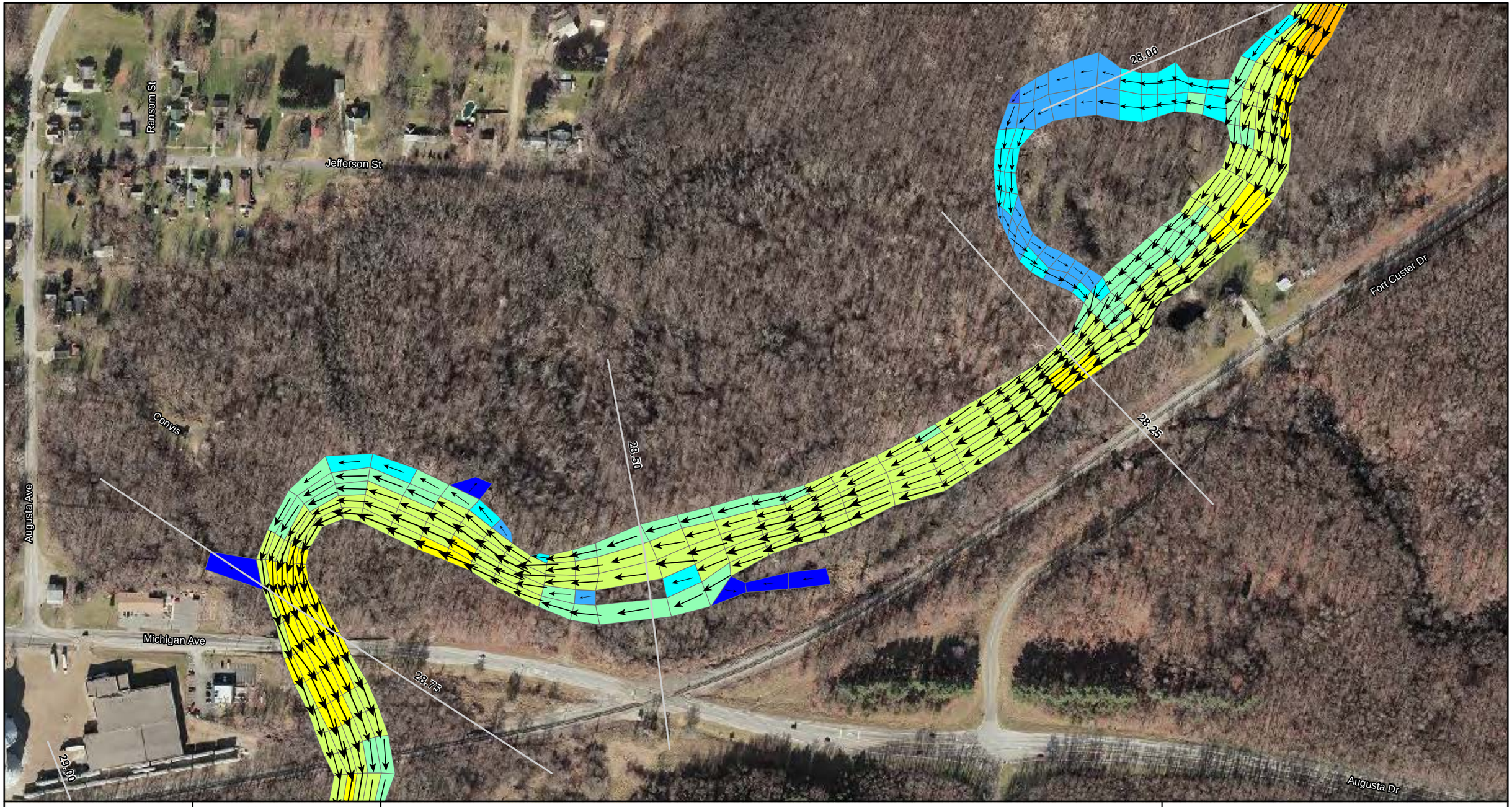
MP 27.45 - MP 28.10

SHEET 35 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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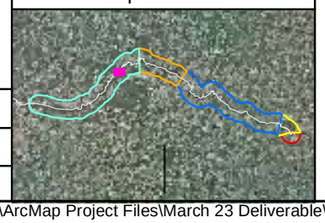
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

MP 28.05 - MP 28.85

SHEET 36 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

Clinton St
Clinton St
Chestnut St
Webster St
Church St
Fayette St
Cass St
Cherry St
Lincoln St
28.75
29.00
29.25
29.50
Augusta Climax Rd
Fort Custer Rec Area Access

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

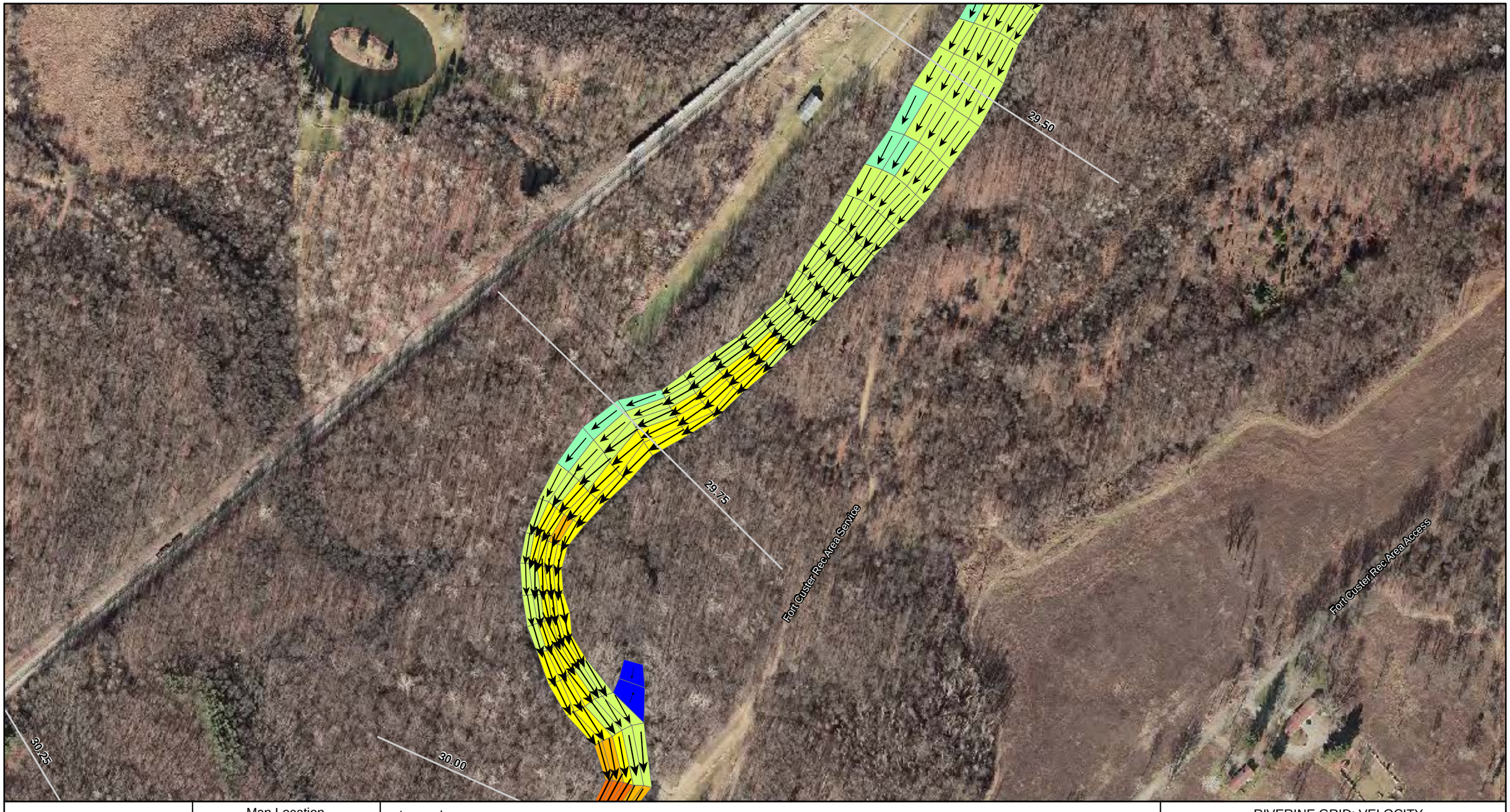
MP 28.85 - MP29.55

SHEET 37 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May20_2011.mxd

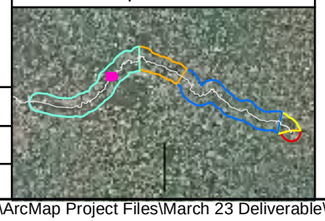
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

MP 29.50 - MP29.95

SHEET 38 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

MP 29.95 - MP 30.80

SHEET 39 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

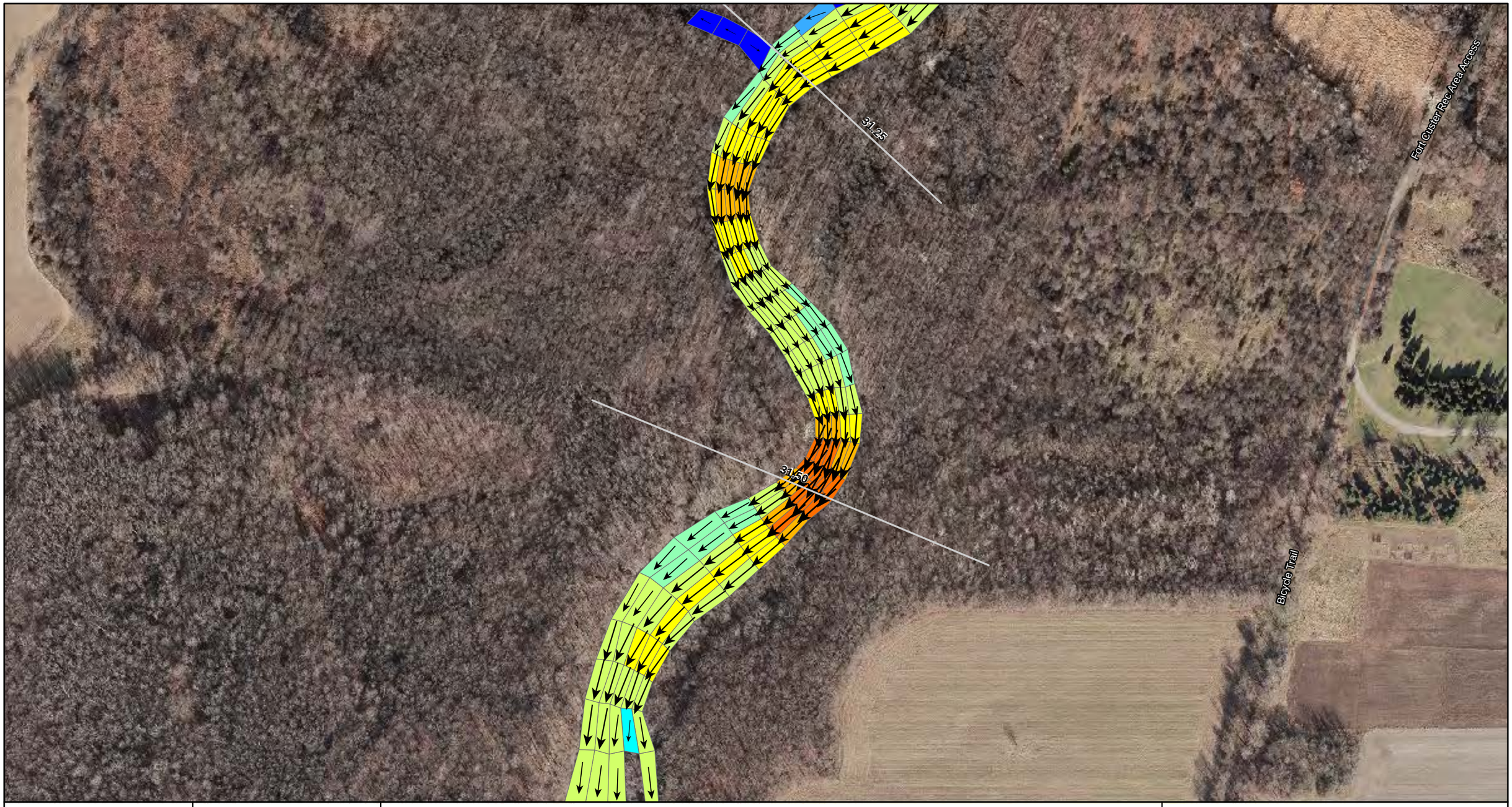
MP 30.75 - MP 31.25

SHEET 40 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May20_2011.mxd

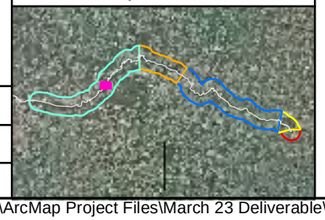
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

MP 31.25 - MP 31.70

SHEET 41 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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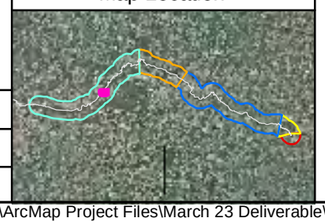
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

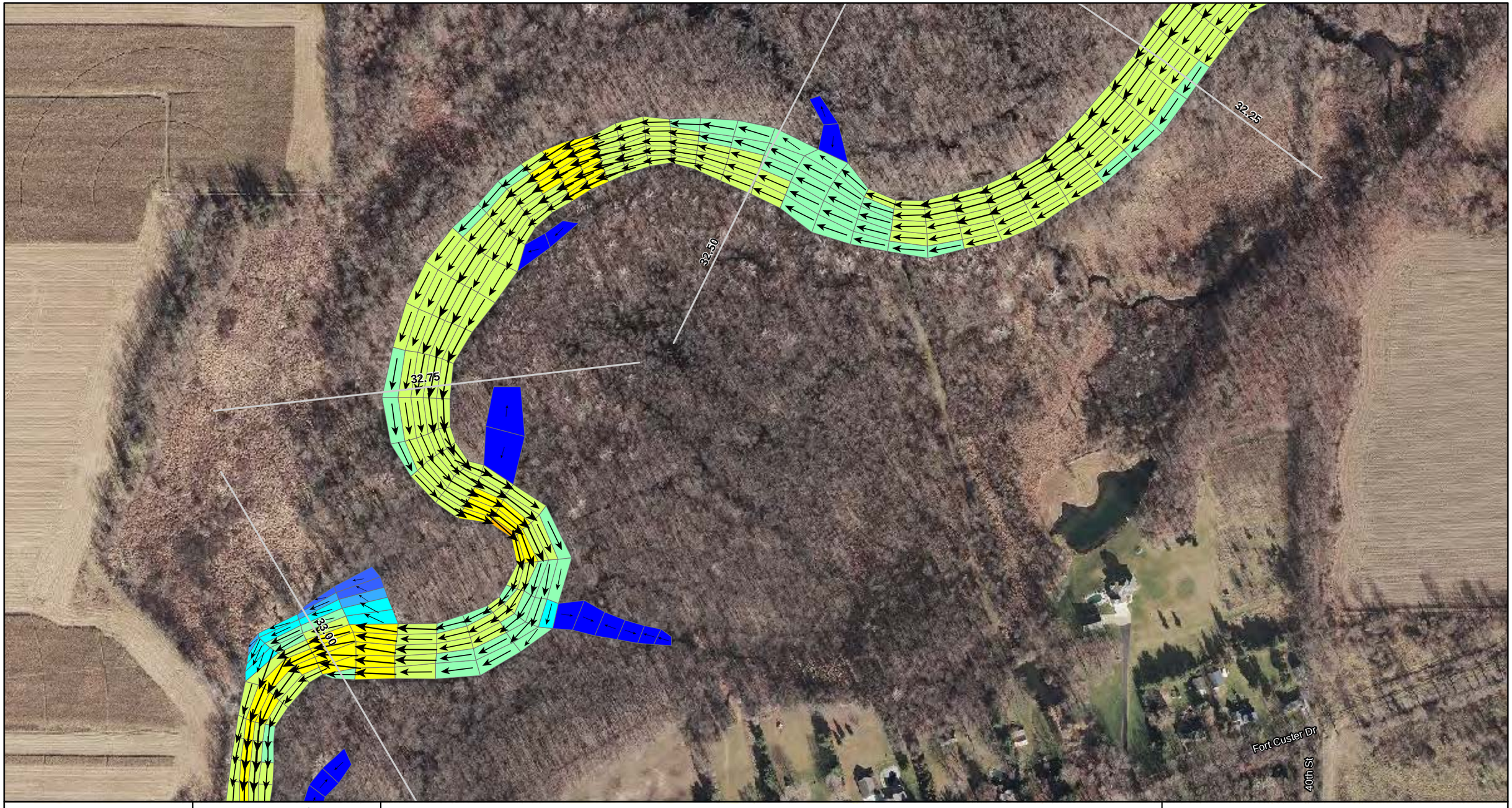
MP 31.65 - MP 32.25

SHEET 42 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May20_2011.mxd

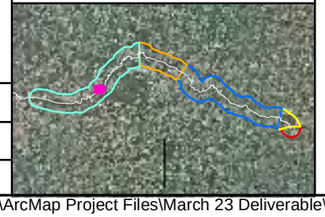
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

MP 32.25 - MP 33.10

SHEET 43 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

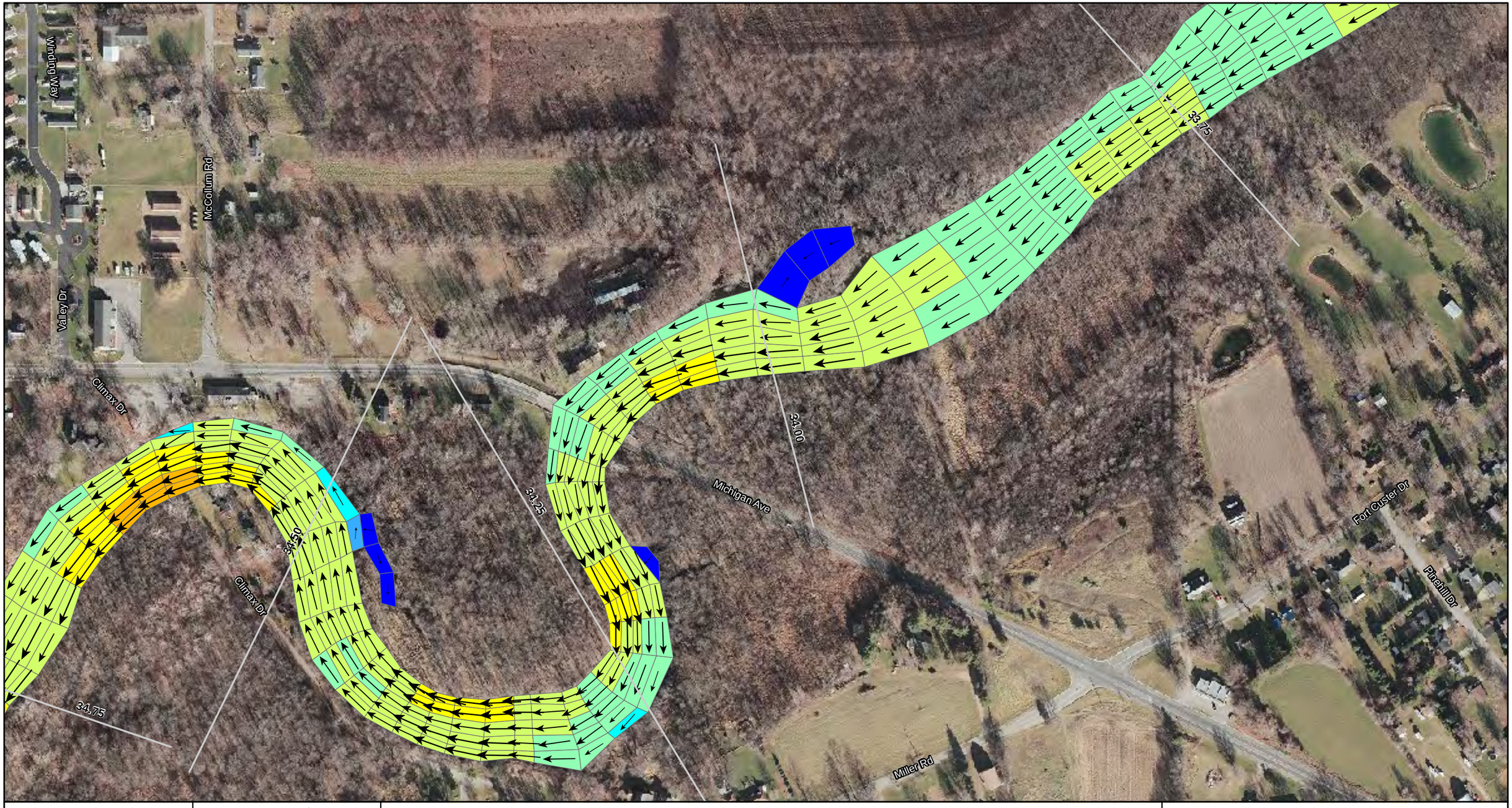
MP 33.10 - MP 33.70

SHEET 44 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

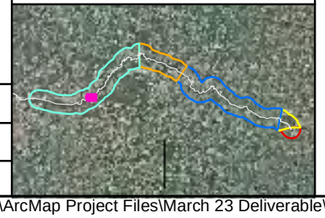
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Aerial Photography Date: November 2011



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

MP 33.70 - MP 34.70

SHEET 45 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

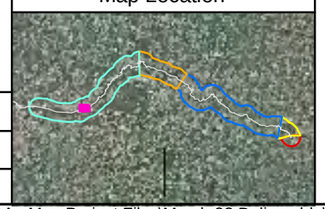
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Aerial Photography Date: November 2011



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

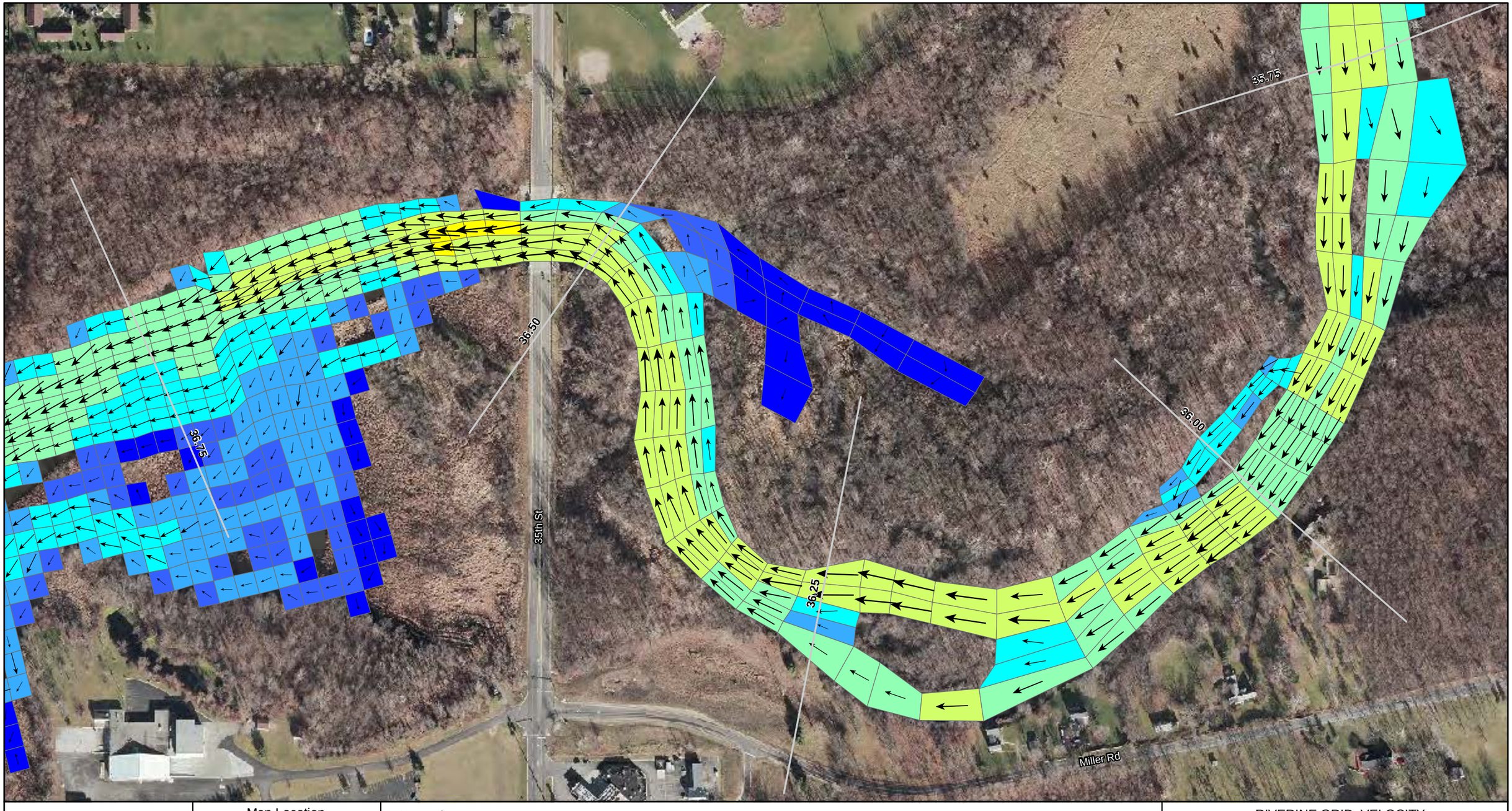
MP 34.70 - MP 35.75

SHEET 46 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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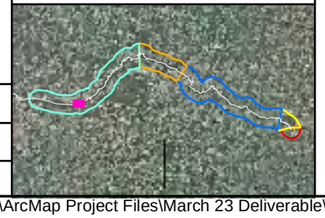
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

MP 35.75 - MP 36.80

SHEET 47 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May20_2011.mxd

Aerial Photography Date: November 2011

37.50

37.25

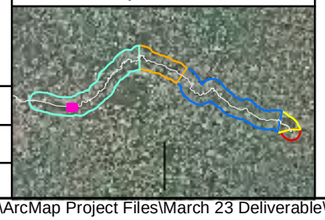
37.00

Miller Dr

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

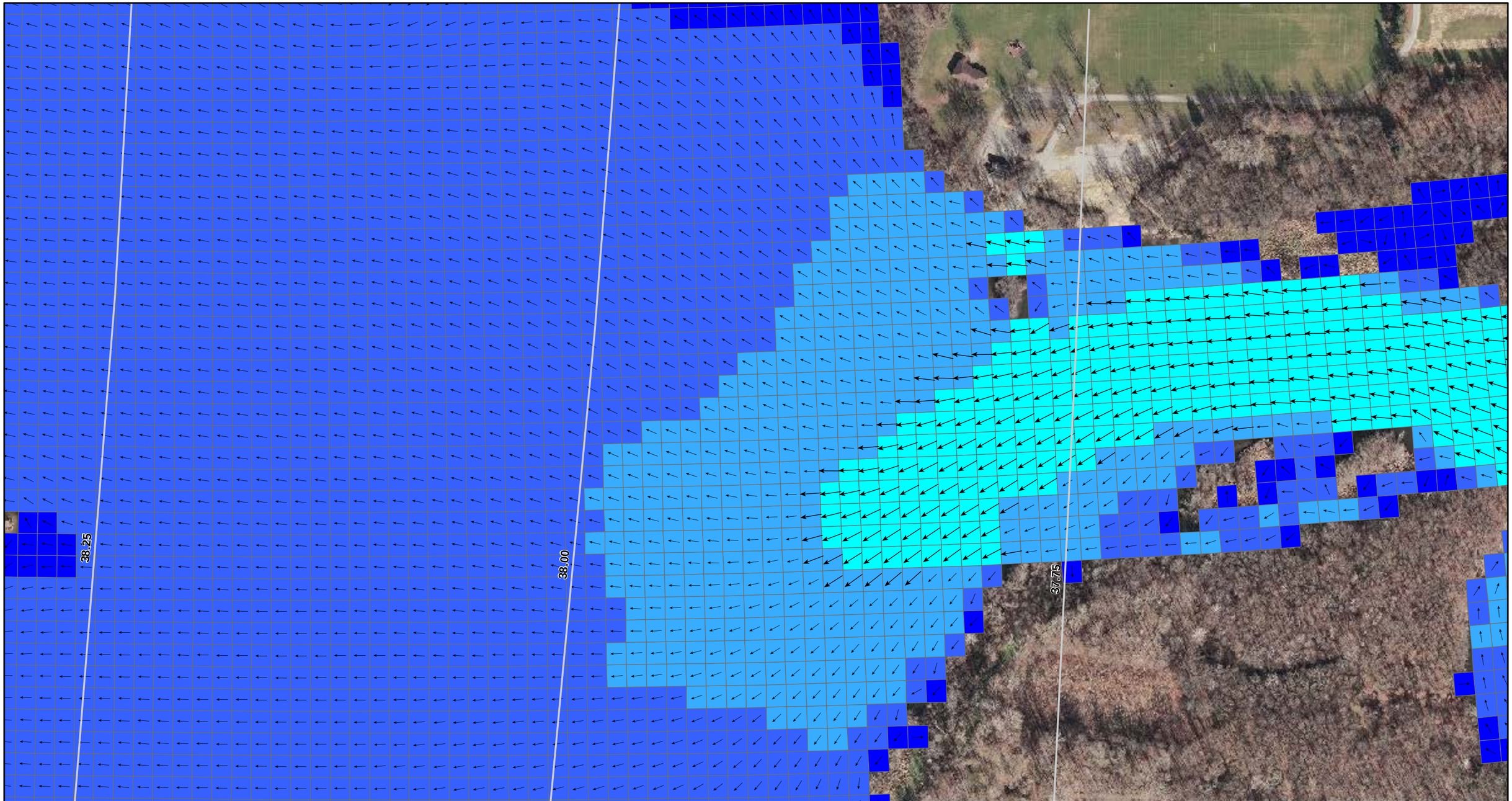
MP 36.80 - MP 37.55

SHEET 48 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May20_2011.mxd

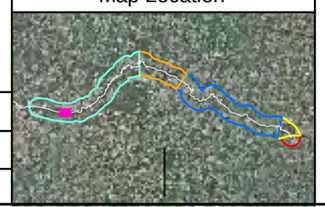
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

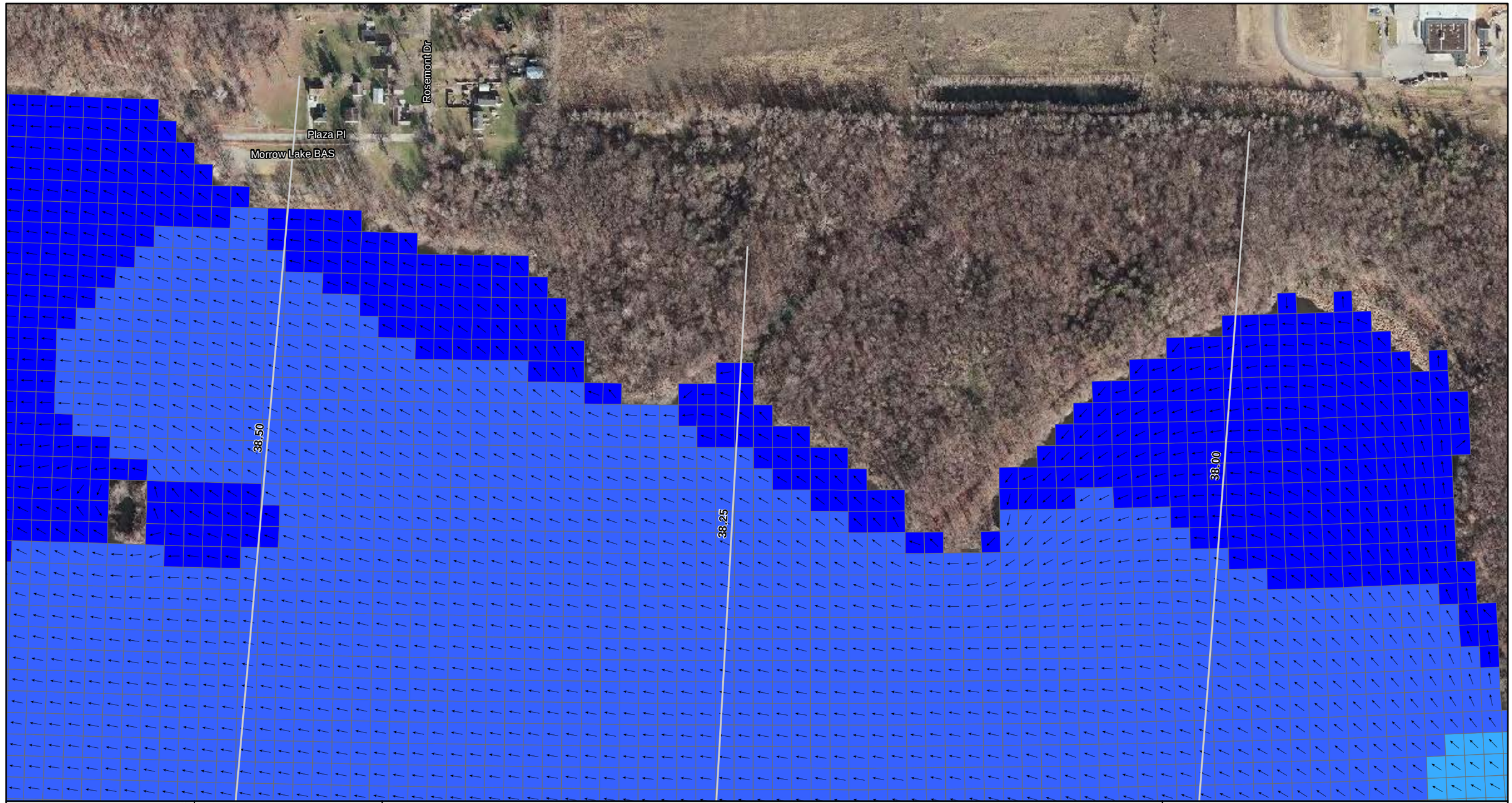
MP 37.55 - MP 38.30

SHEET 49 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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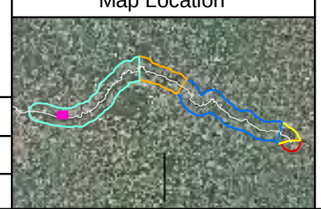
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

MP 37.80 - MP 38.60N

SHEET 50 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May20_2011.mxd

Aerial Photography Date: November 2011

38.50

38.25

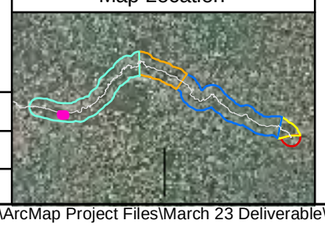
38.00

Lyth Rd

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

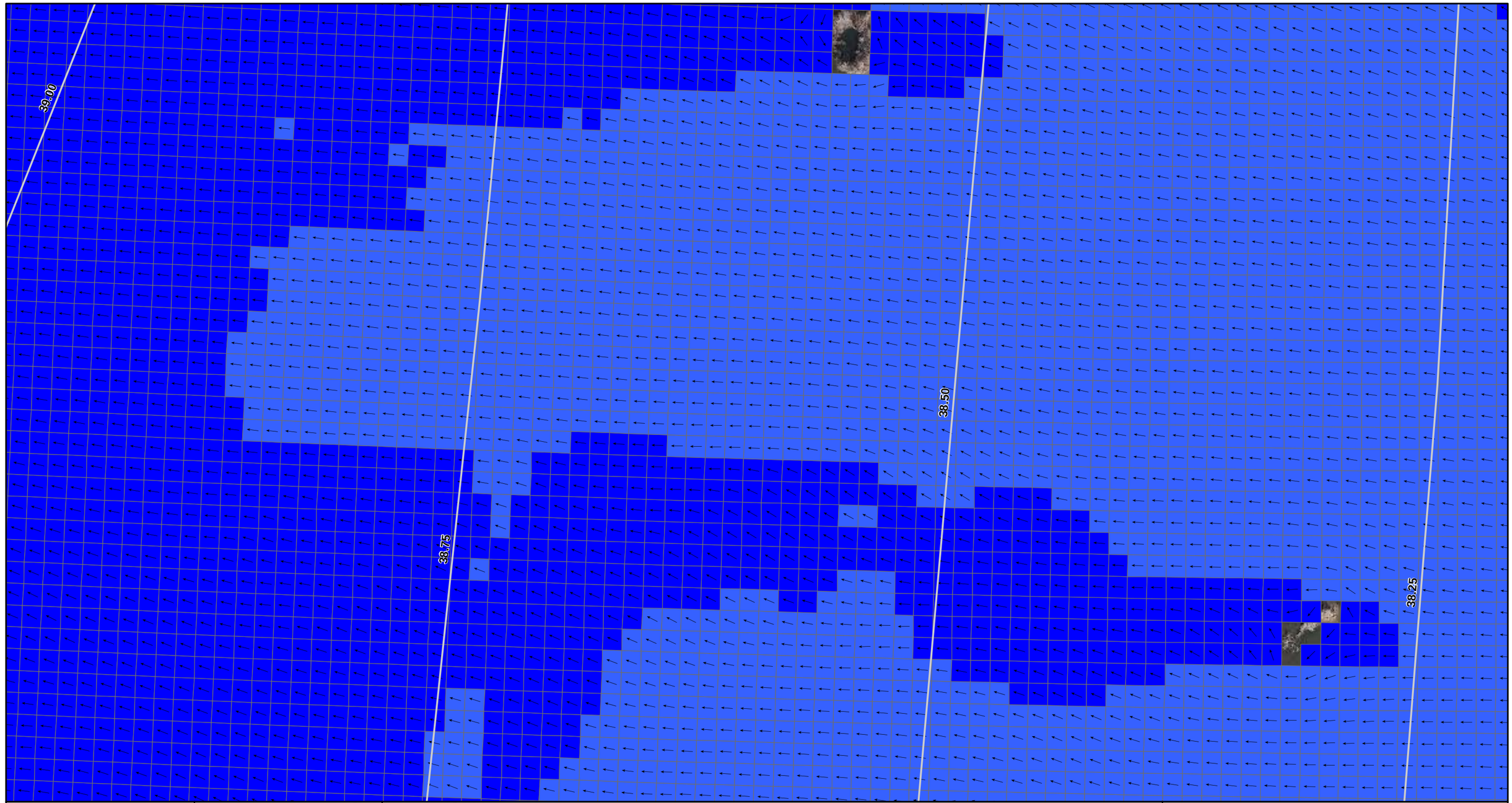
MP 37.80 - MP 38.60S

SHEET 51 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

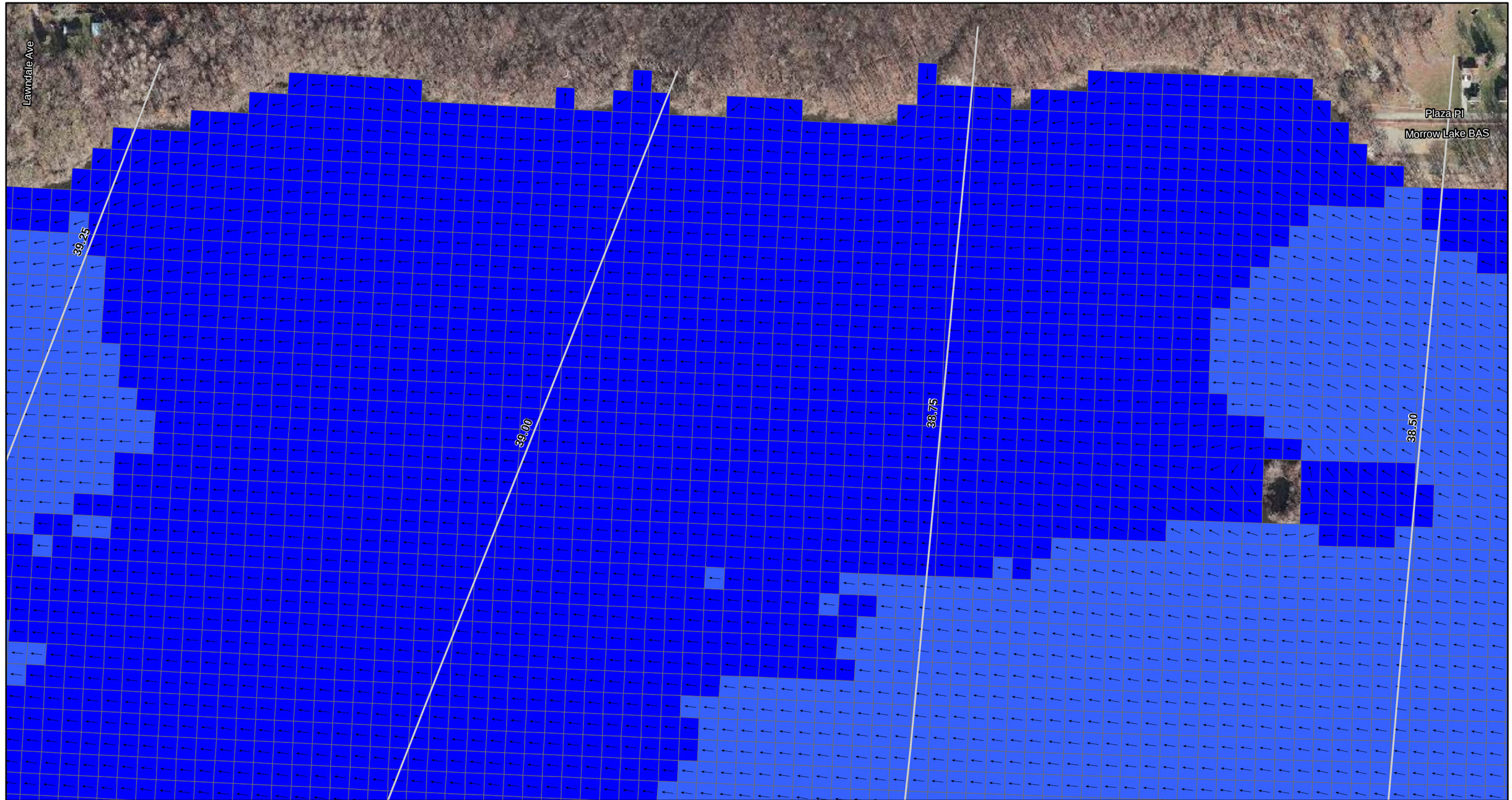
MP 38.25 - MP 39.00C

SHEET 52 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

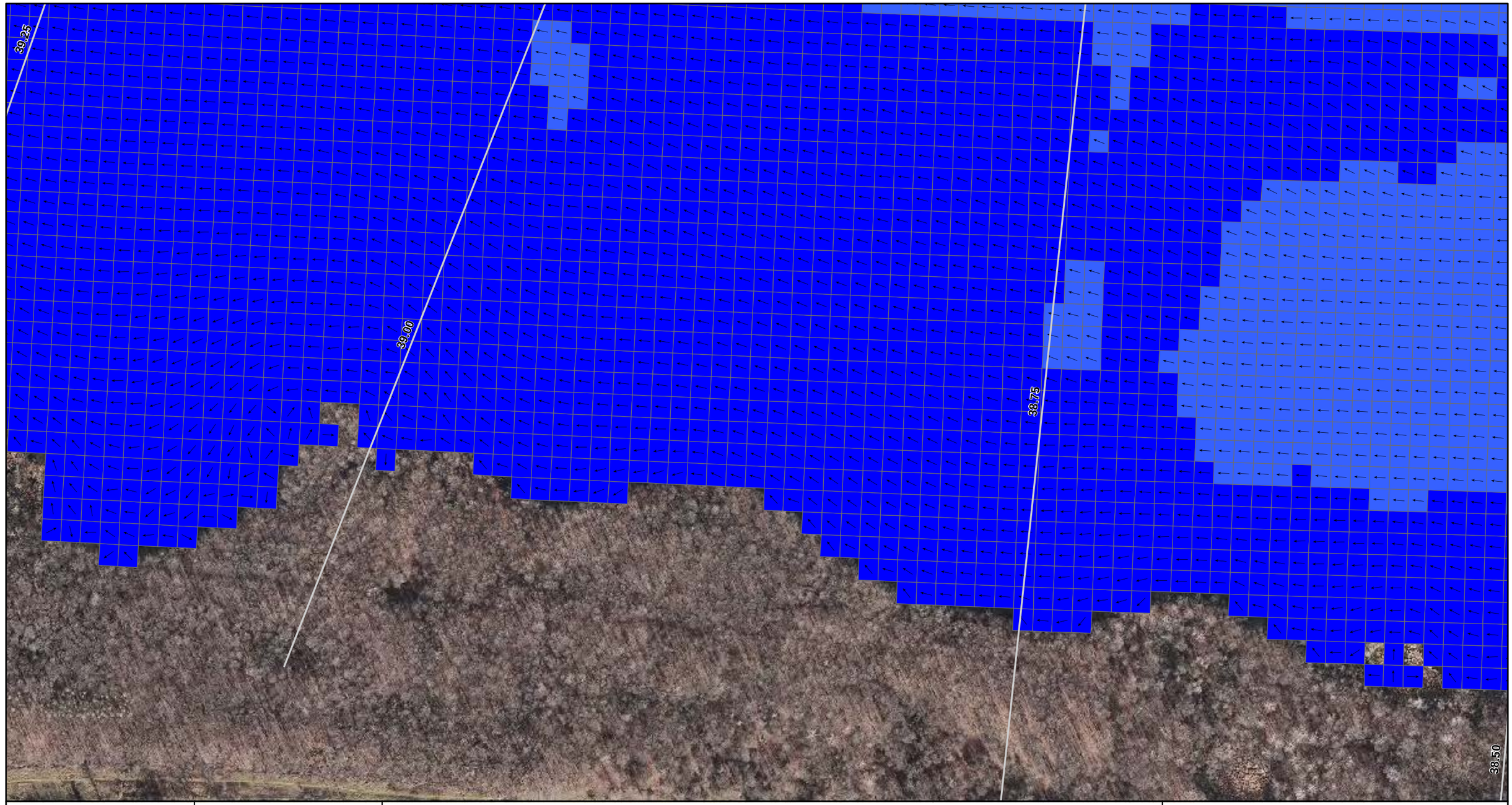
MP 38.50 - MP 39.25N

SHEET 53 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May20_2011.mxd

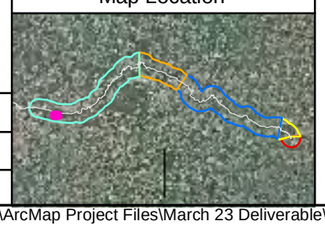
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

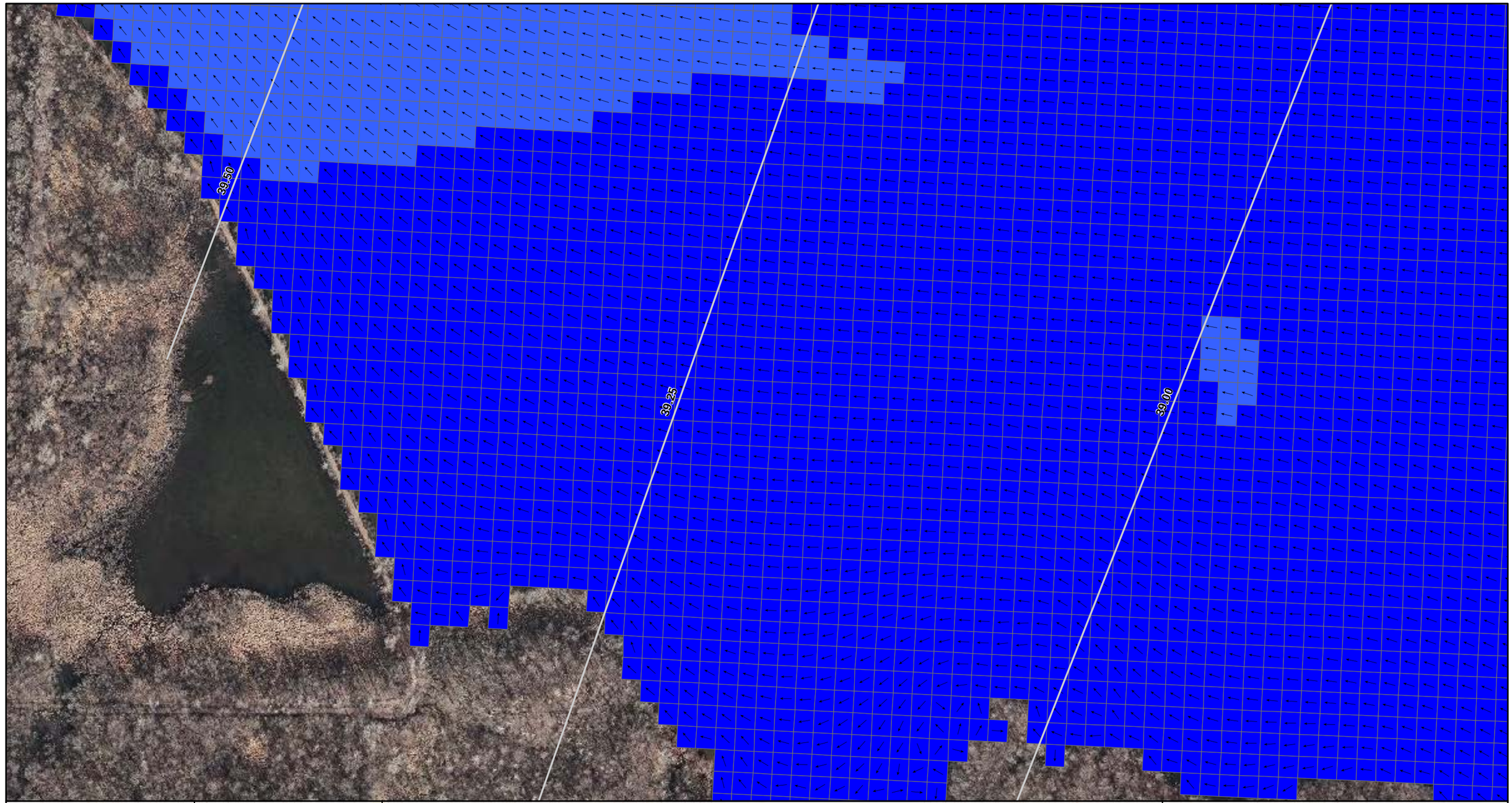
MP 38.50 - MP 39.25S

SHEET 54 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

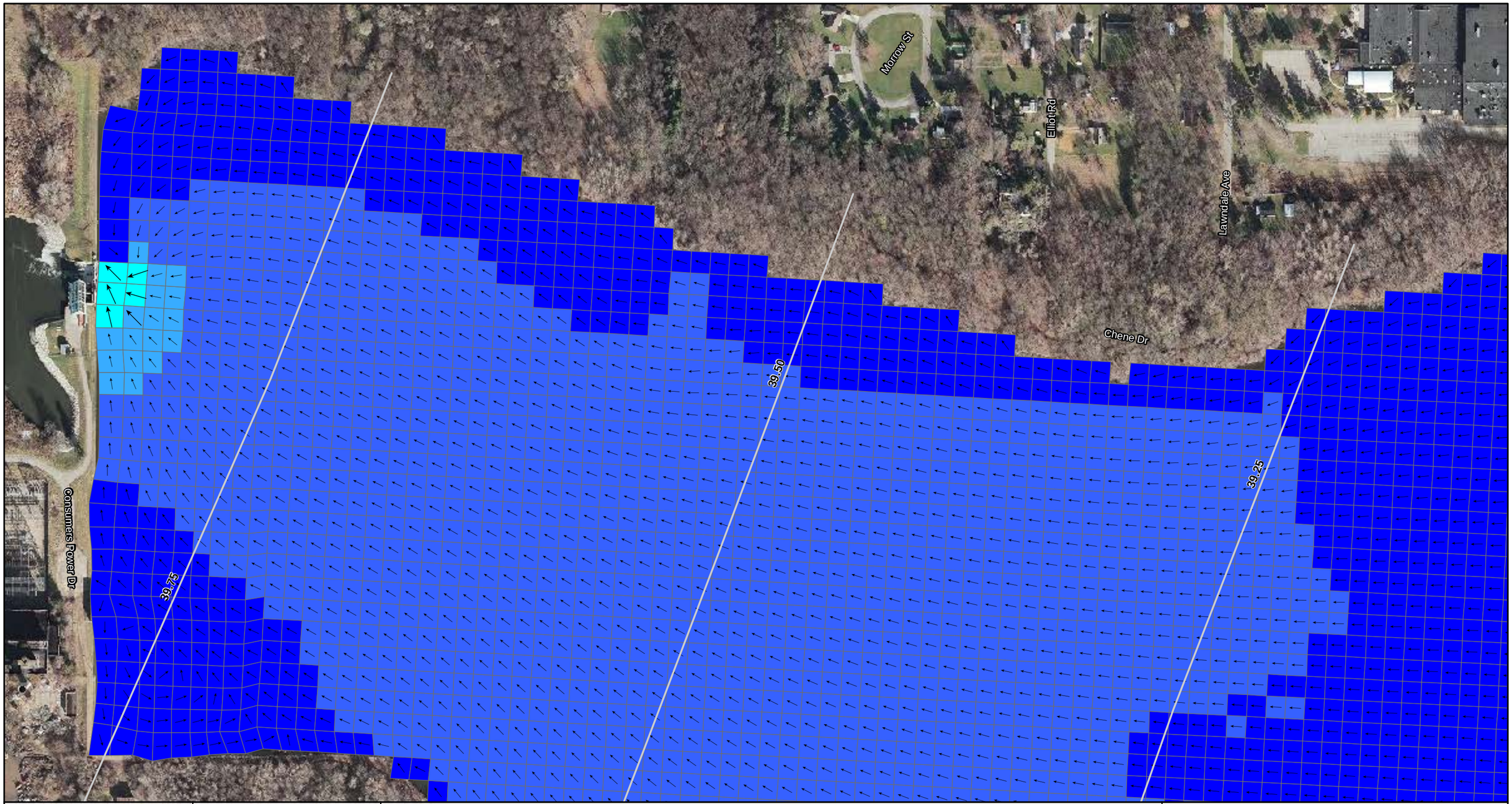
MP 38.90 - MP 39.60S

SHEET 55 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May20_2011.mxd

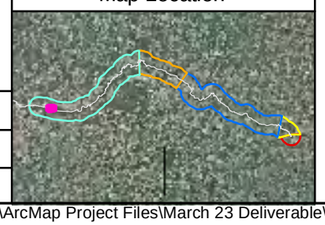
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 20, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 20, 2011

MP 39.15 - MP 39.85

SHEET 56 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

Figure 5-8

Riverine Grid: Velocity

May 21, 2011

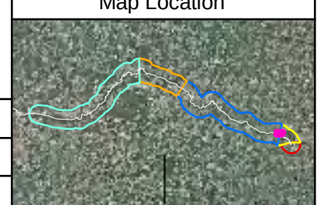
Sheets 1 through 56



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

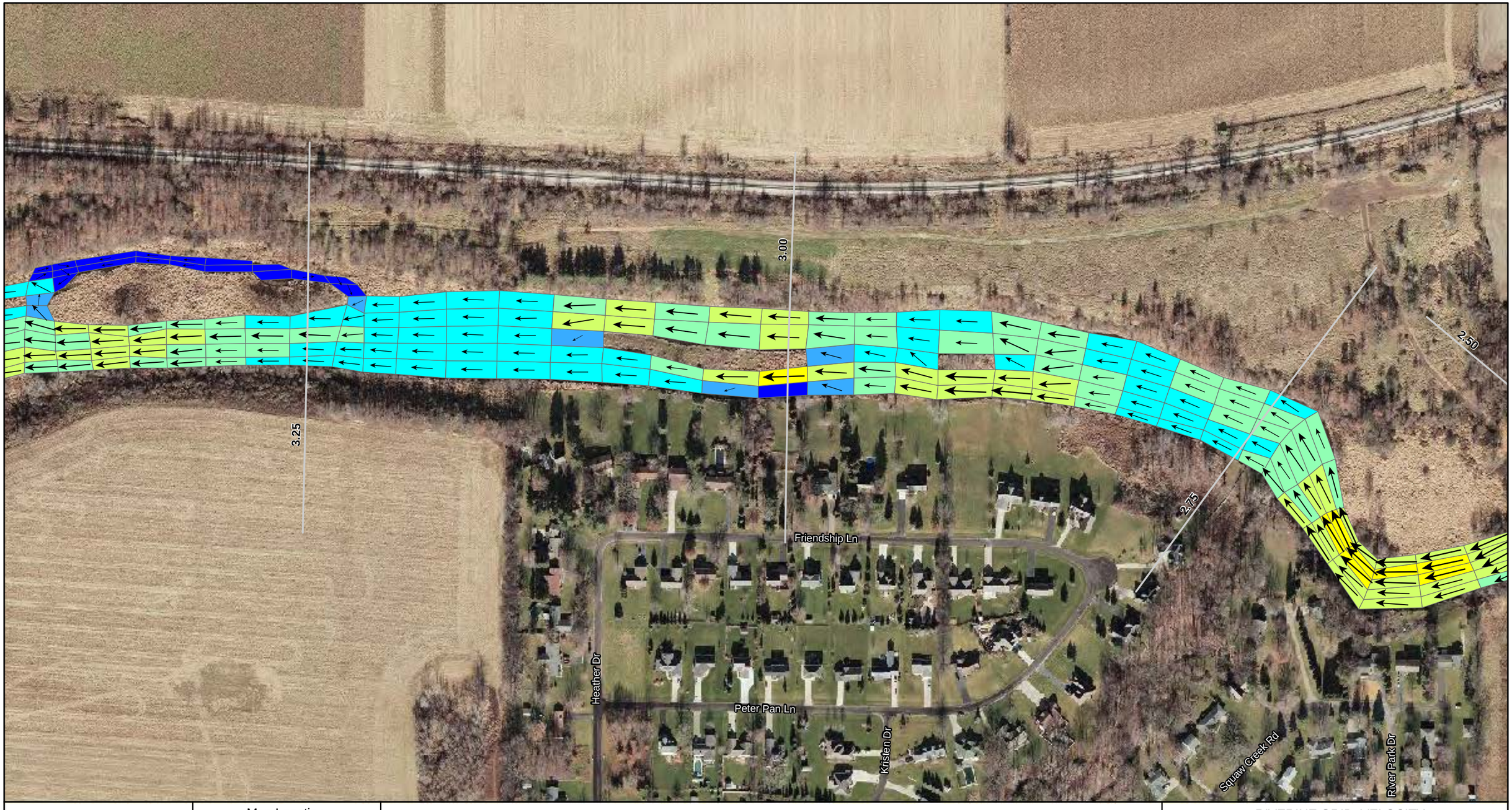
MP 01.95 - MP 02.75

SHEET 1 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May21_2011.mxd

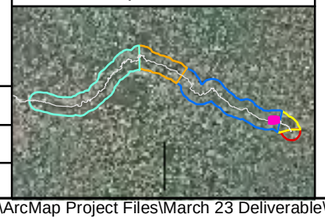
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

MP 02.60 - MP 03.40

SHEET 2 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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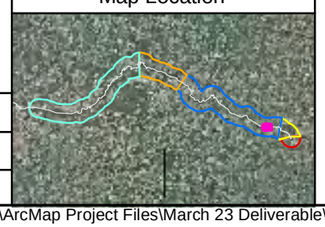
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

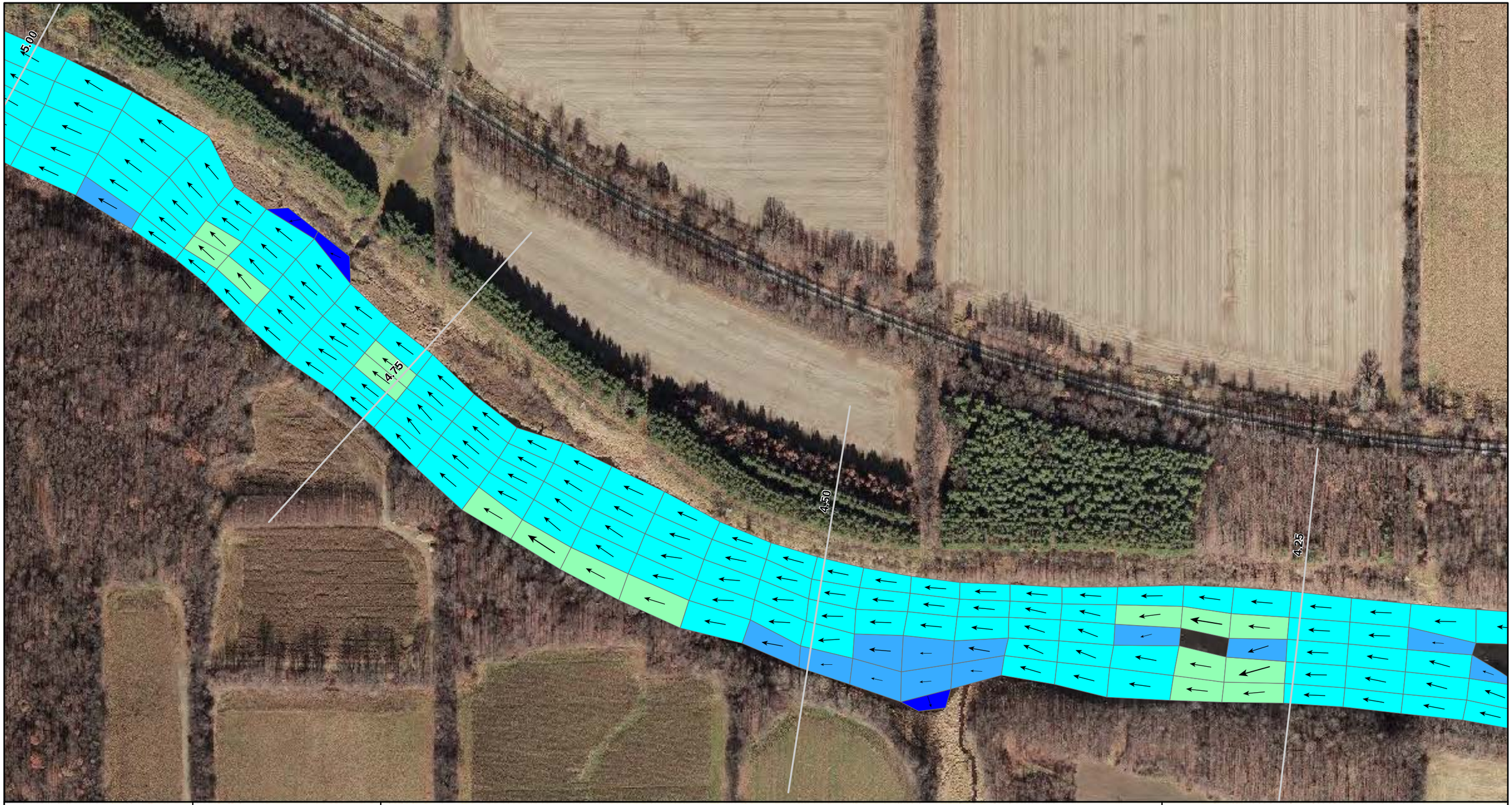
MP 03.40 - MP 04.20

SHEET 3 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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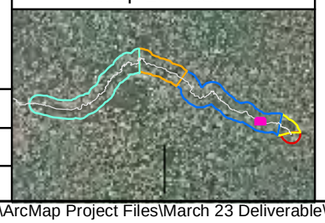
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

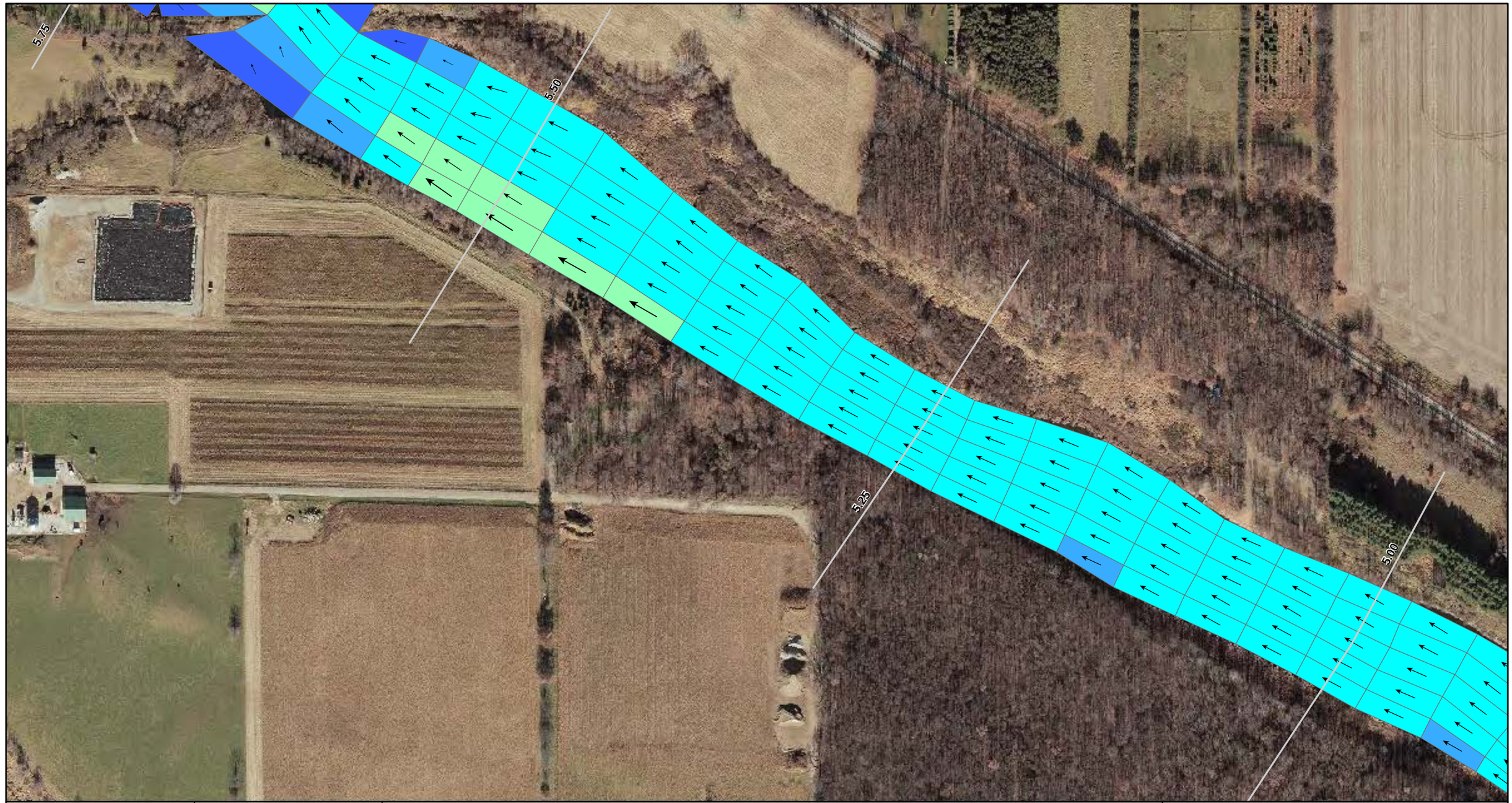
MP 04.15 - MP 05.00

SHEET 4 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

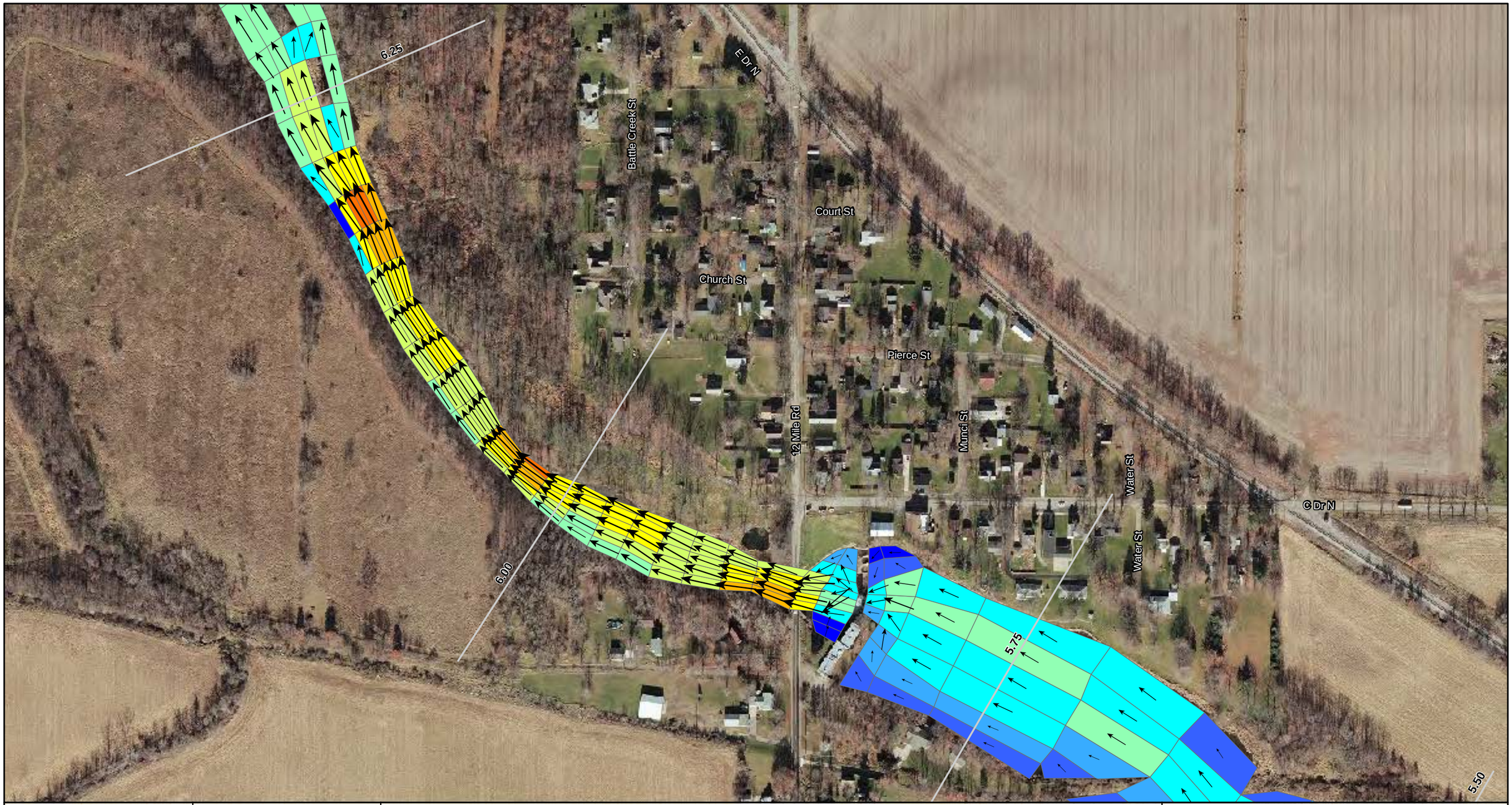
MP 04.90 - MP 05.65

SHEET 5 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May21_2011.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

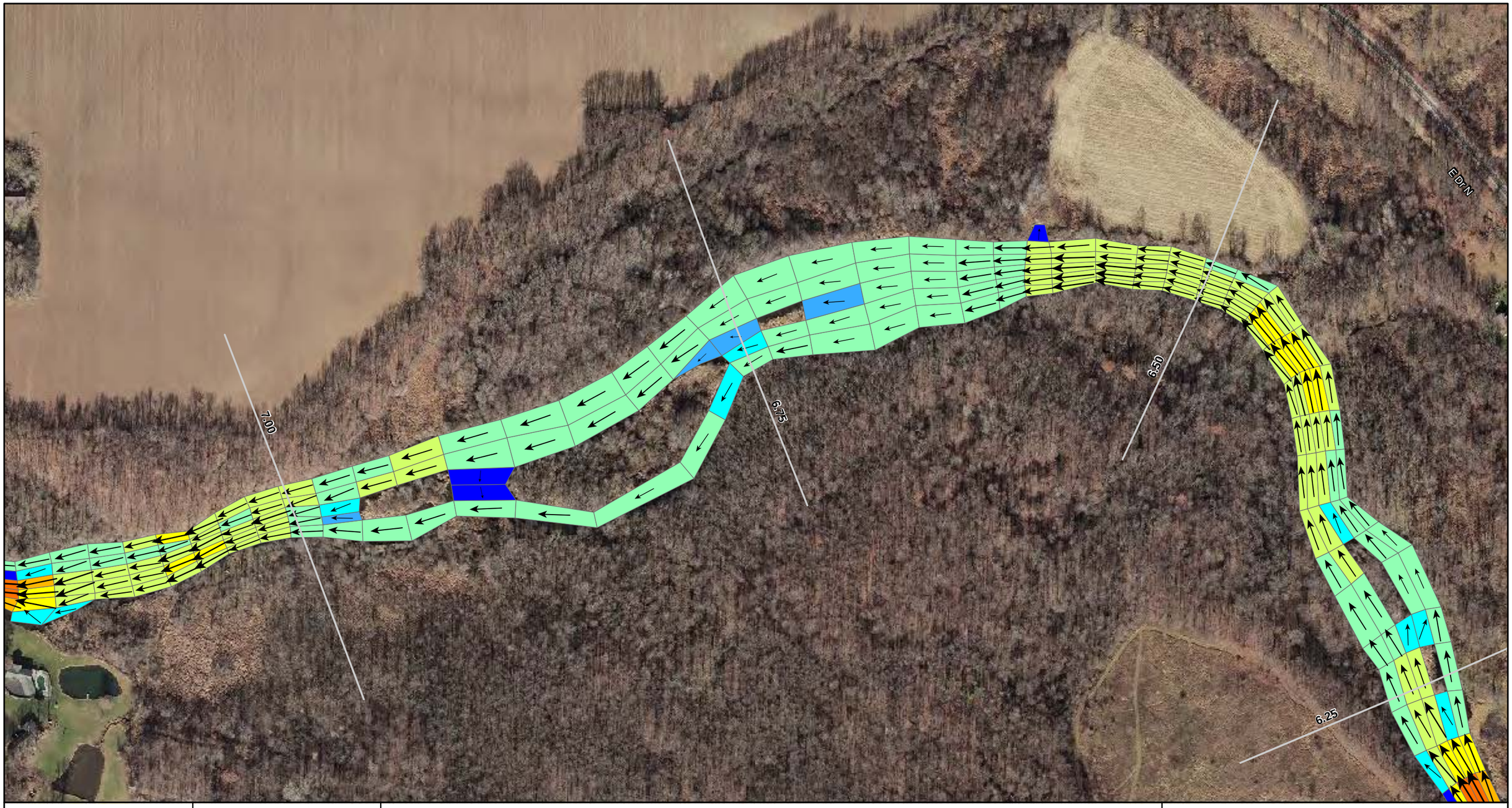
MP 05.65 - MP 06.30

SHEET 6 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May21_2011.mxd

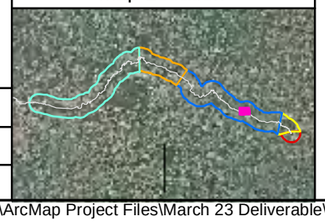
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

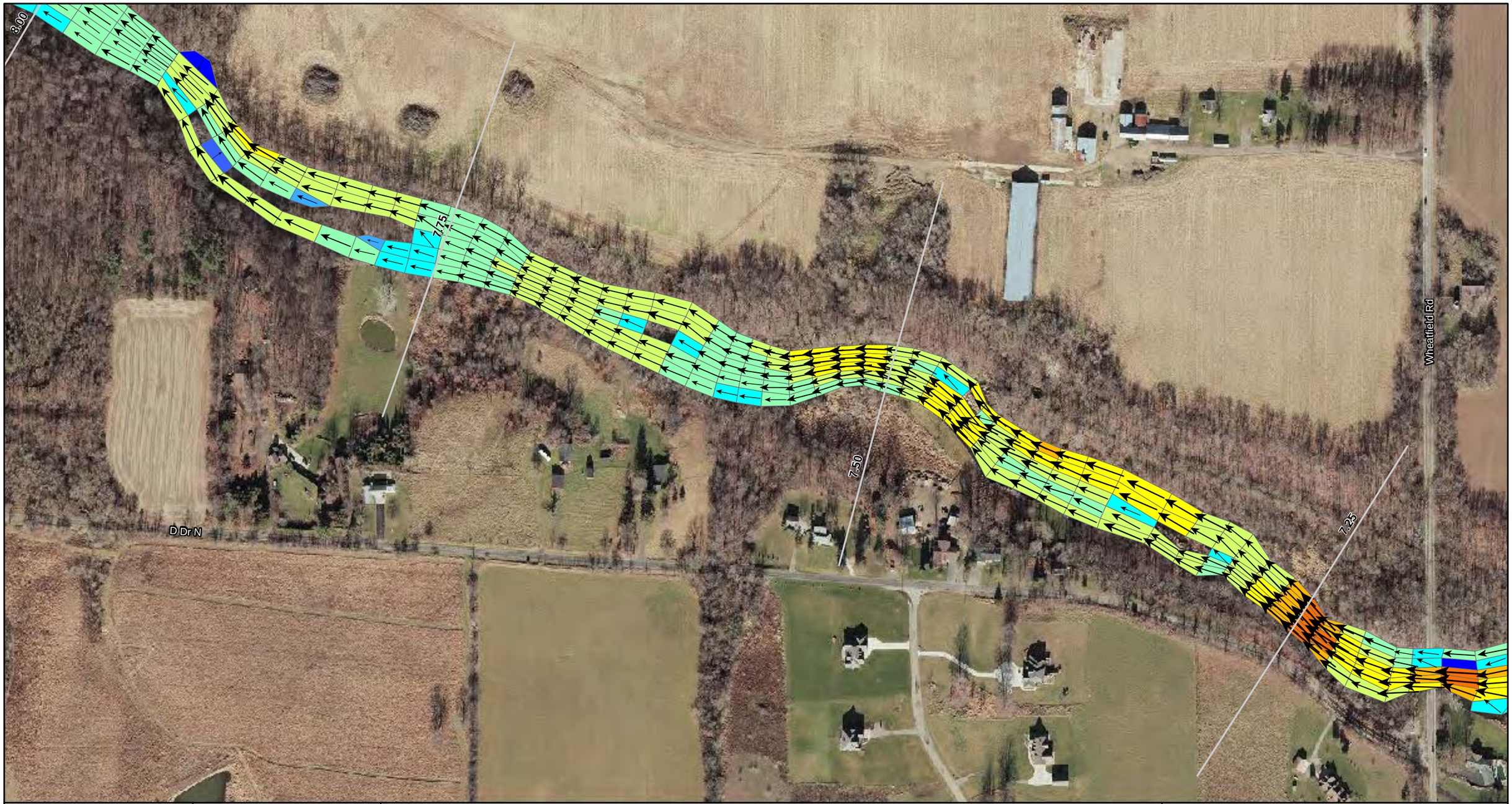
MP 06.20 - MP 07.15

SHEET 7 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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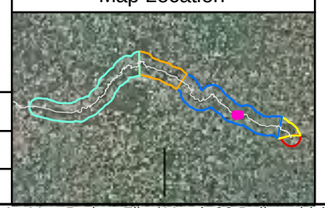
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

MP 07.15 - MP 07.95

SHEET 8 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

8.75

8.50

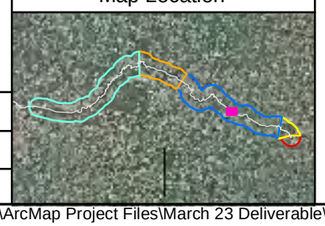
8.25

8.00

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

MP 07.90 - MP 08.75

SHEET 9 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

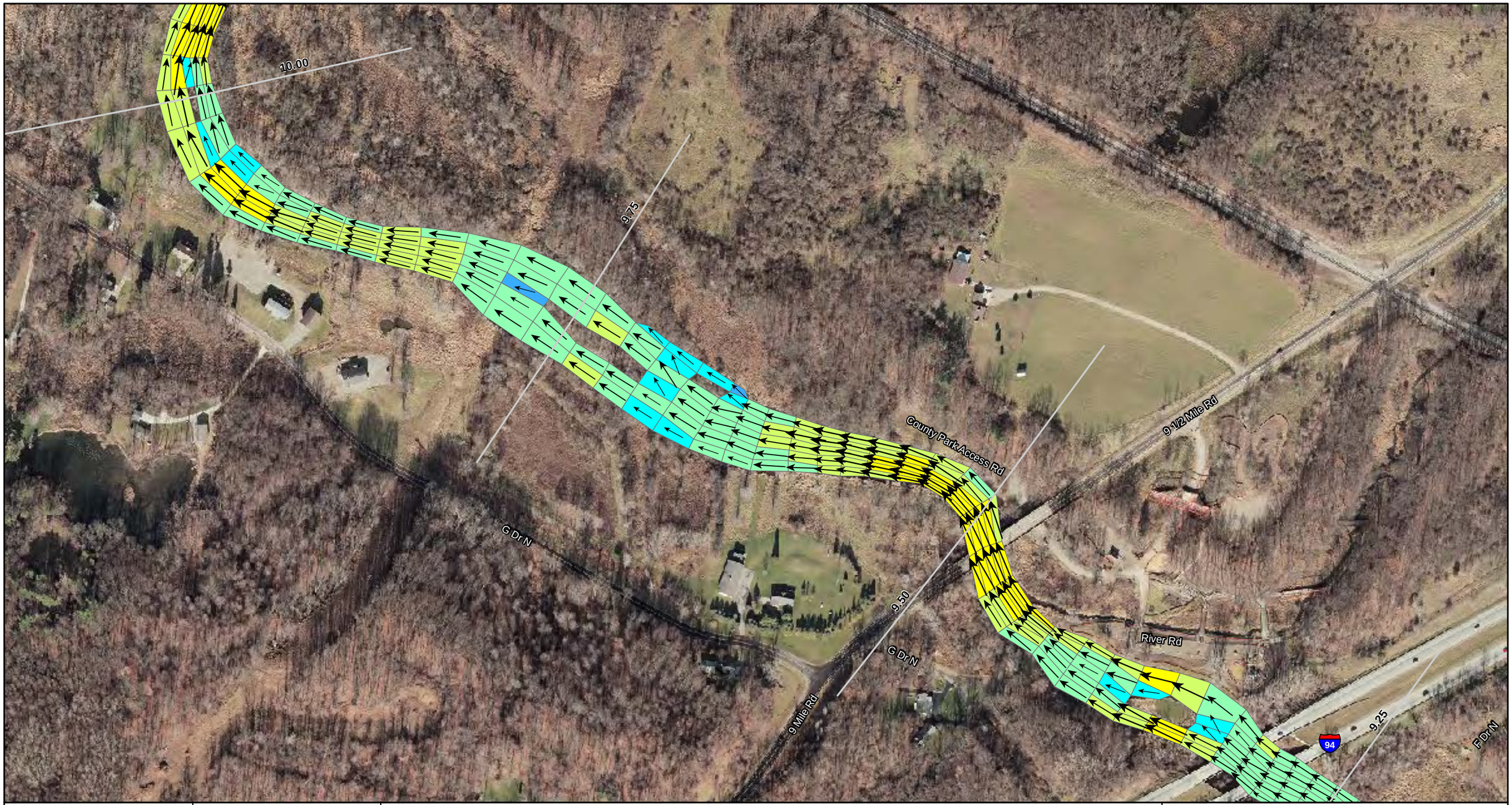
MP 08.70 - MP 09.30

SHEET 10 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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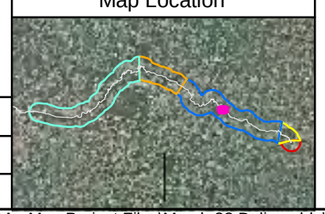
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

MP 09.25 - MP 10.05

SHEET 11 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

10.50

10.25

10.00

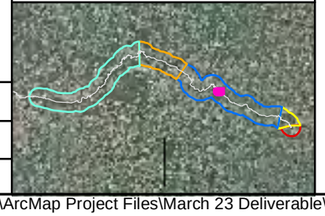
River Rd E

Golden Ave

G Dr N

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

MP 10.00 - MP 10.65

SHEET 12 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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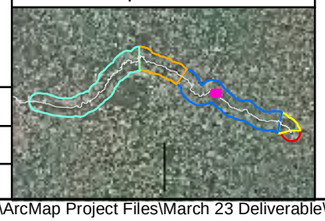
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

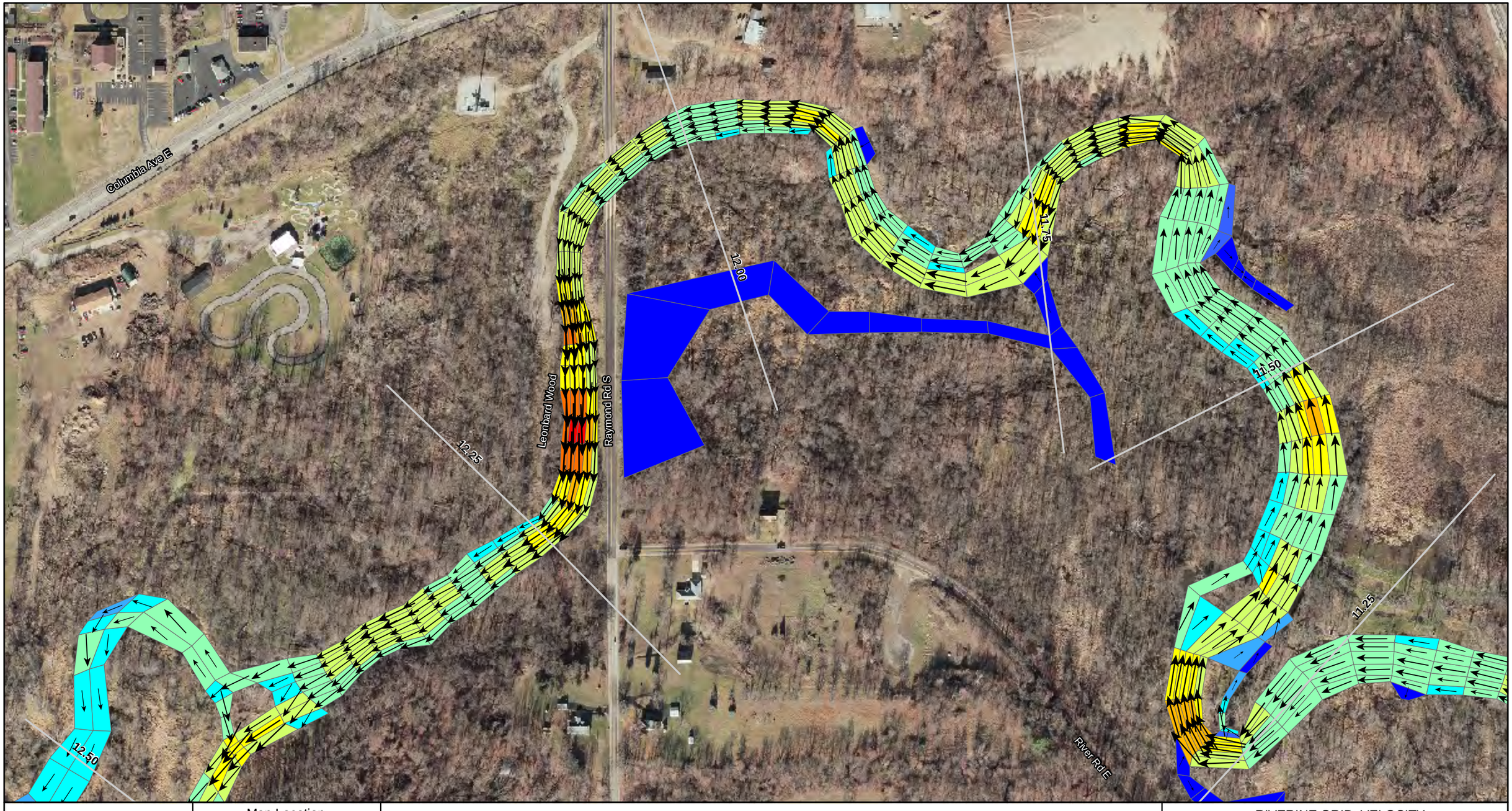
MP 10.60 - MP 11.40

SHEET 13 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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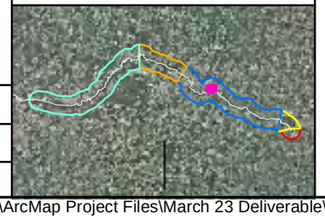
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

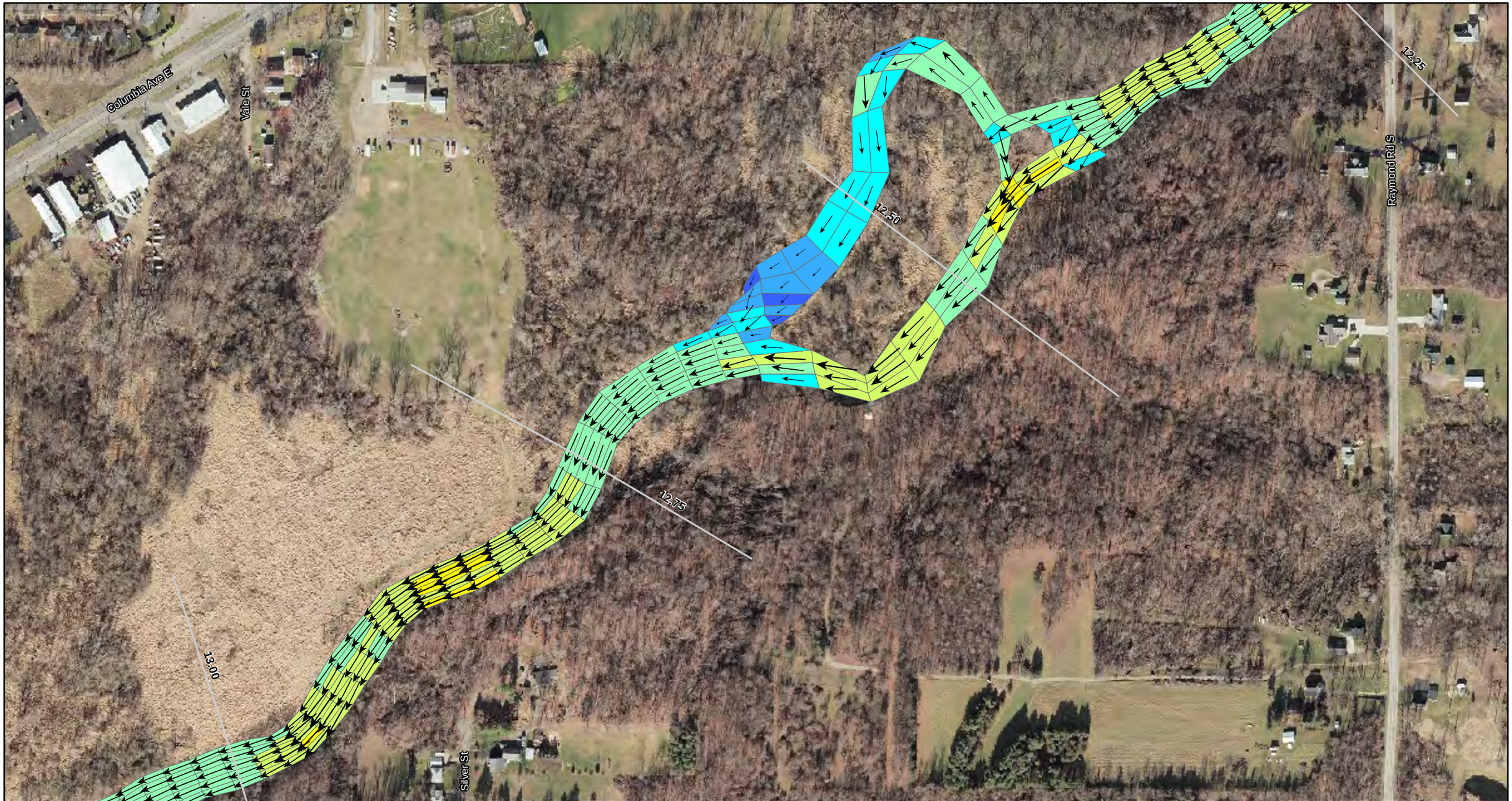
MP 11.10 - MP 12.45

SHEET 14 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

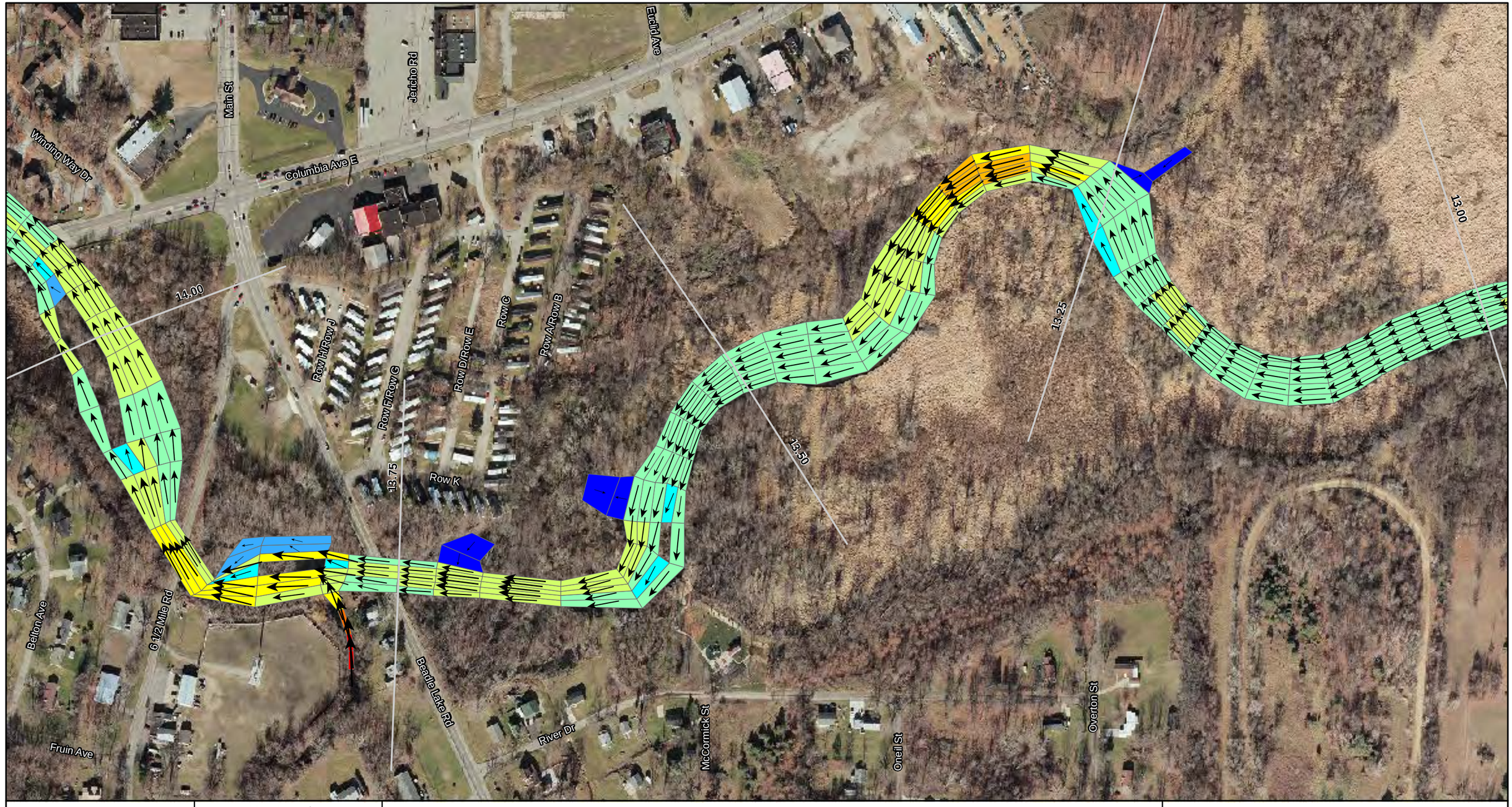
MP 12.30 - MP 13.05

SHEET 15 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May21_2011.mxd

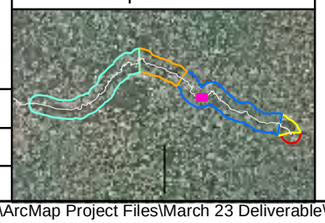
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

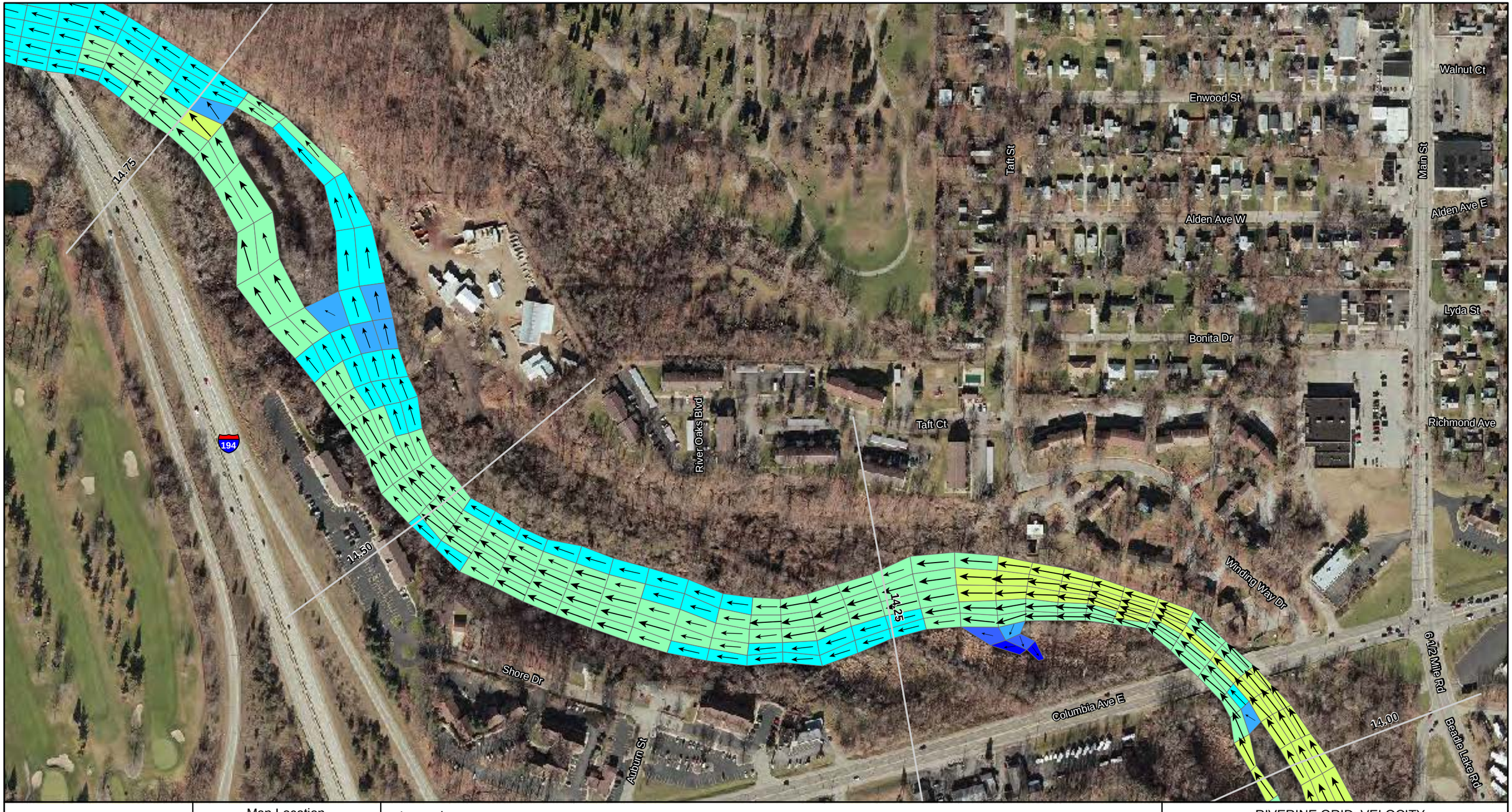
MP 13.00 - MP 14.10

SHEET 16 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May21_2011.mxd

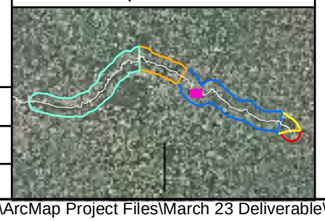
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

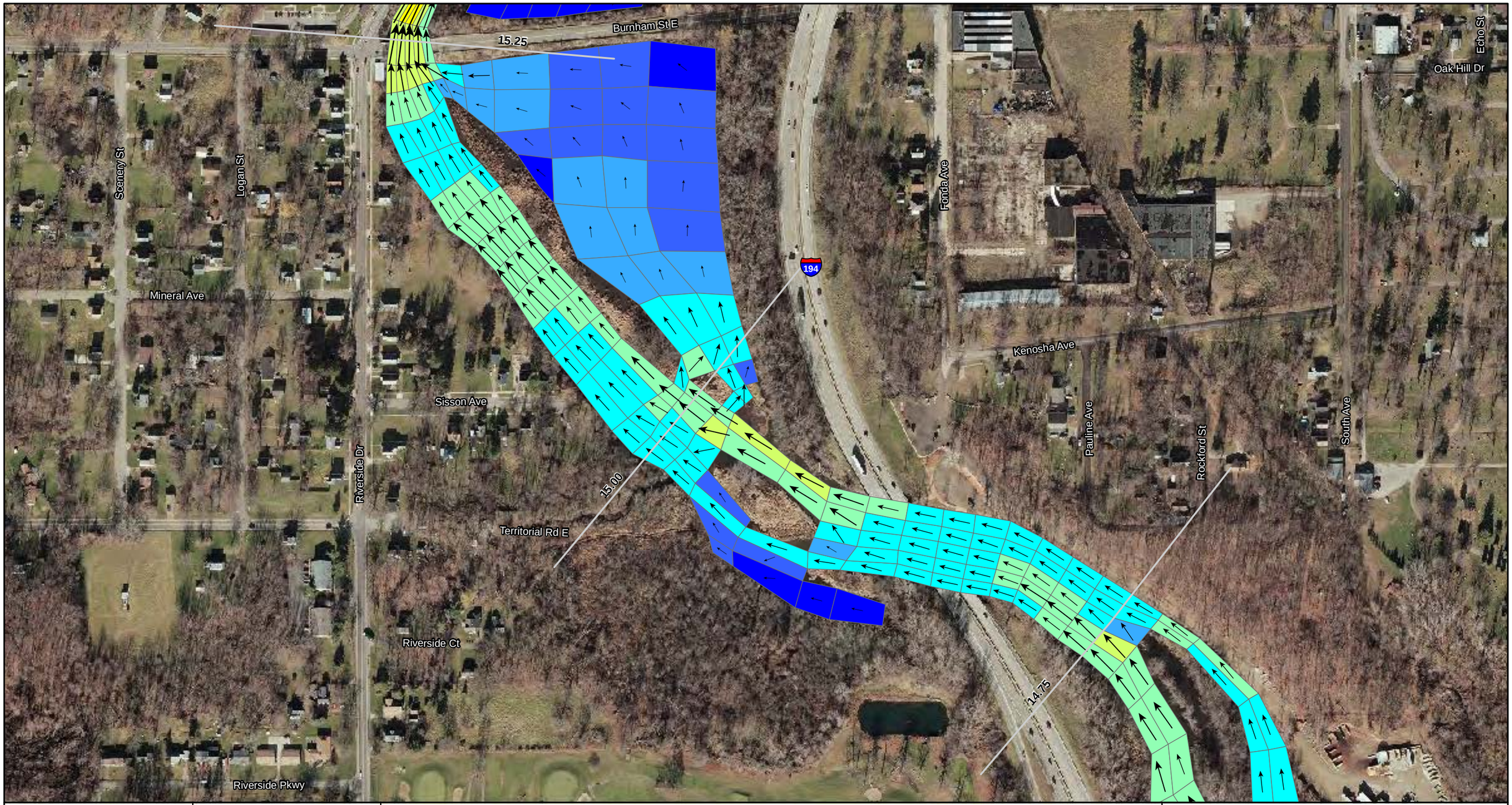
MP 14.00 - MP 14.85

SHEET 17 OF 56

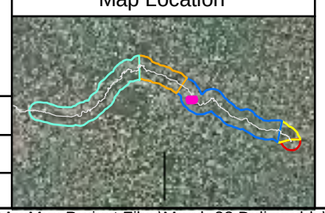
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May21_2011.mxd

Aerial Photography Date: November 2011



Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
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- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

RIVERINE GRID: VELOCITY
MAY 21, 2011

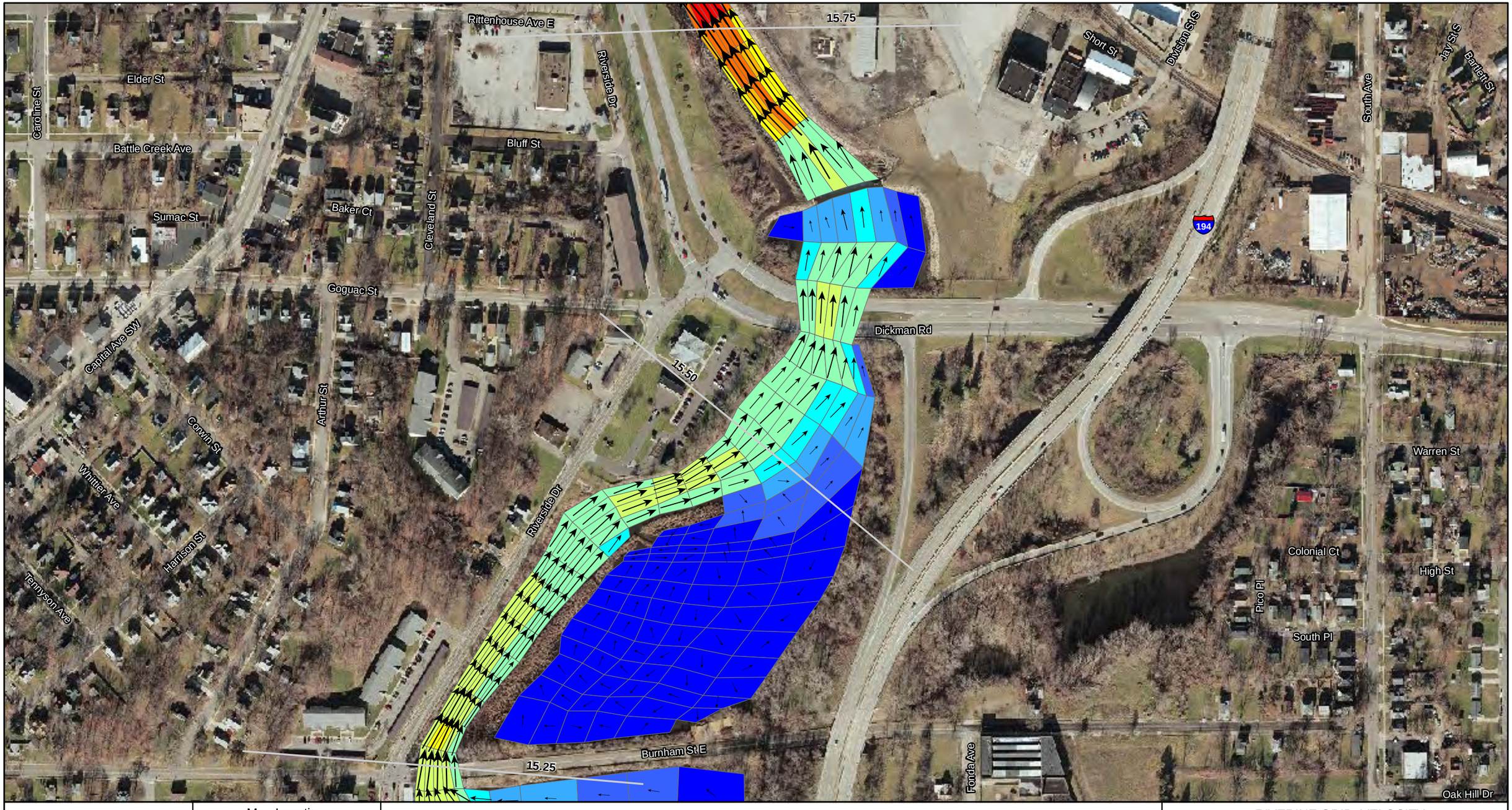
MP 14.65 - MP 15.25

SHEET 18 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May21_2011.mxd

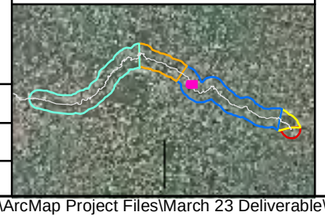
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

MP 15.25 - MP 15.75

SHEET 19 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May21_2011.mxd

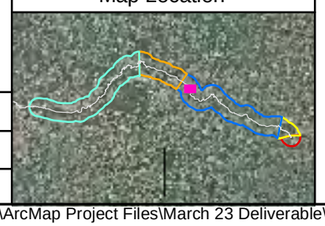
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

MP 15.75 - MP 16.30

SHEET 20 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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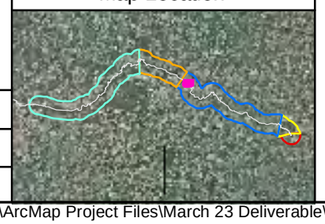
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

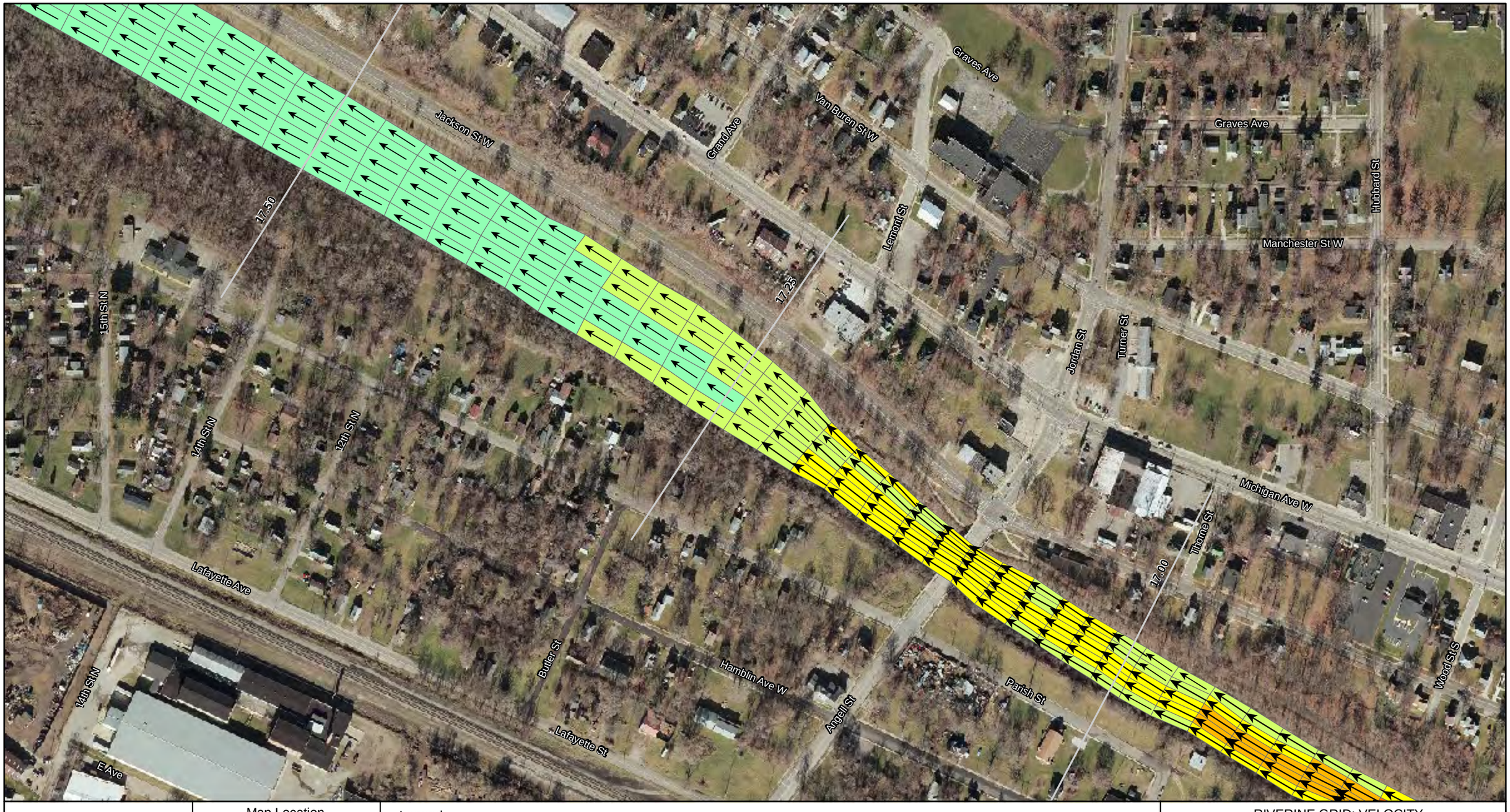
MP 16.30 - MP 16.95

SHEET 21 OF 56

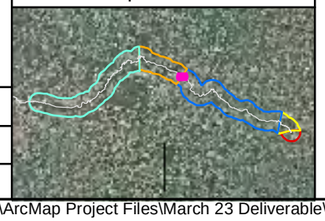
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

RIVERINE GRID: VELOCITY
MAY 21, 2011

MP 16.85 - MP 17.60

SHEET 22 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

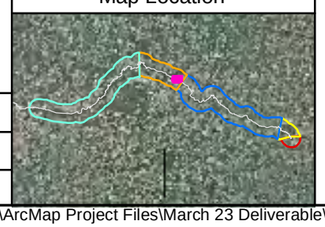
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Aerial Photography Date: November 2011



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

MP 17.60 - MP 18.40

SHEET 23 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May21_2011.mxd

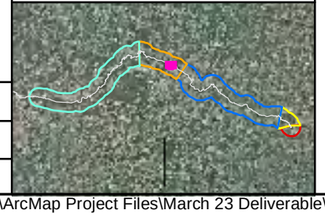
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
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- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

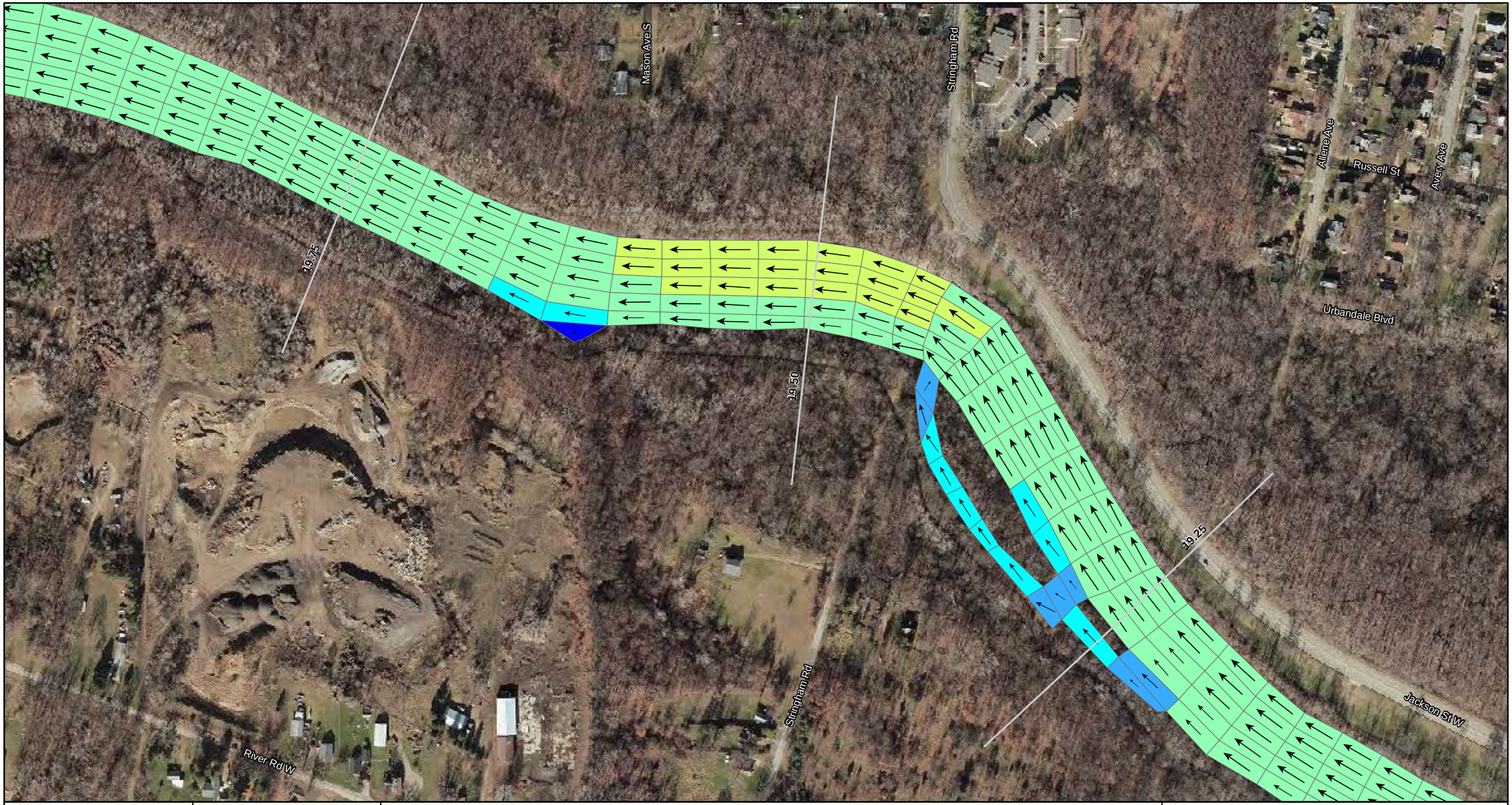
MP 18.30 - MP 19.15

SHEET 24 OF 56

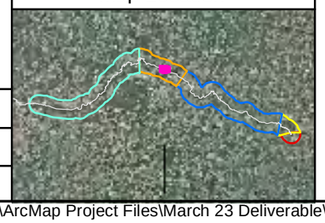
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



Map Location



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

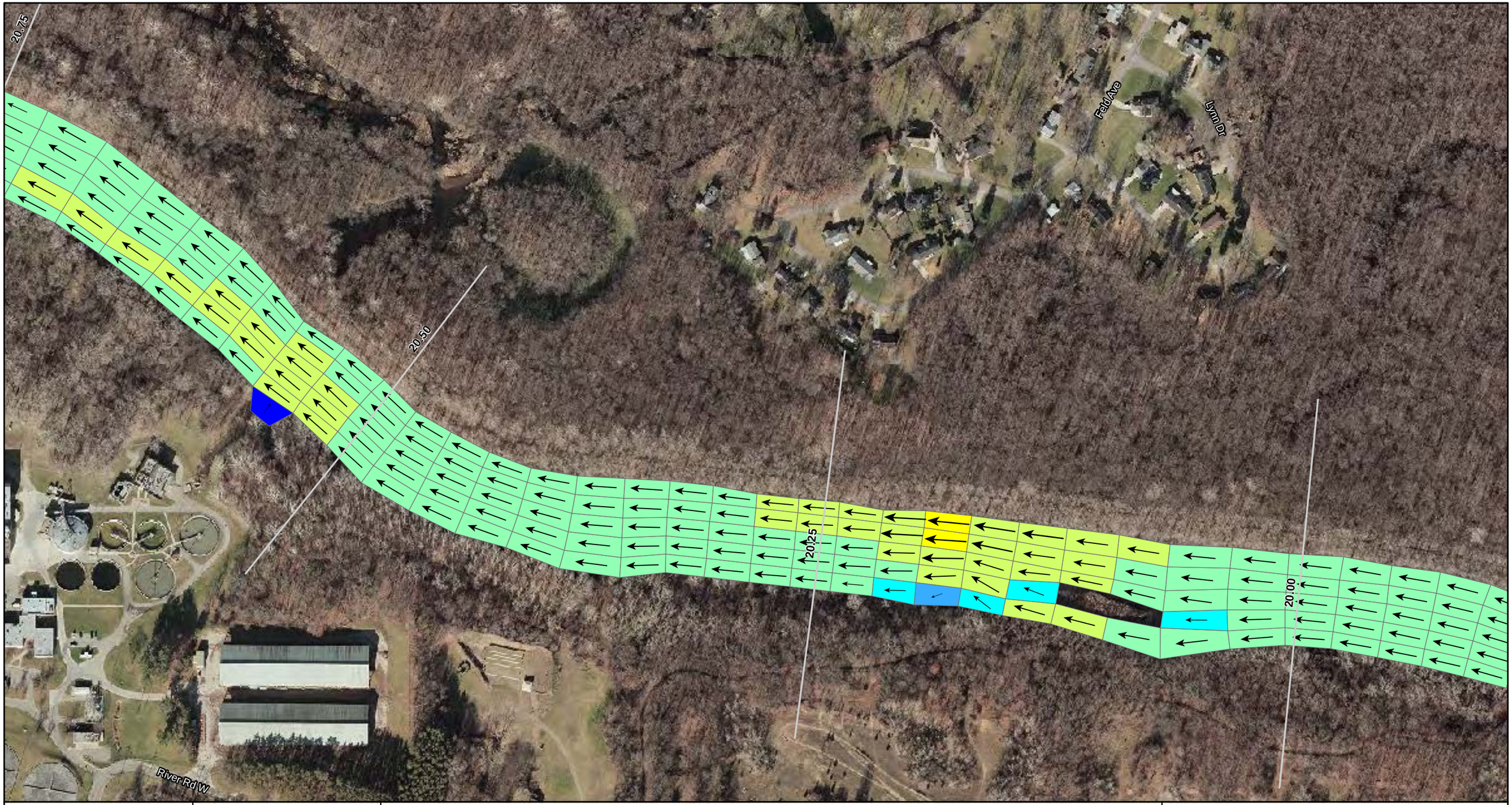
MP 19.10 - MP 19.95

SHEET 25 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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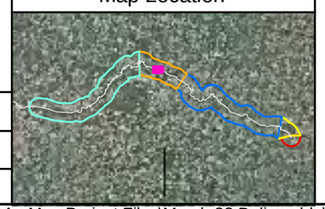
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

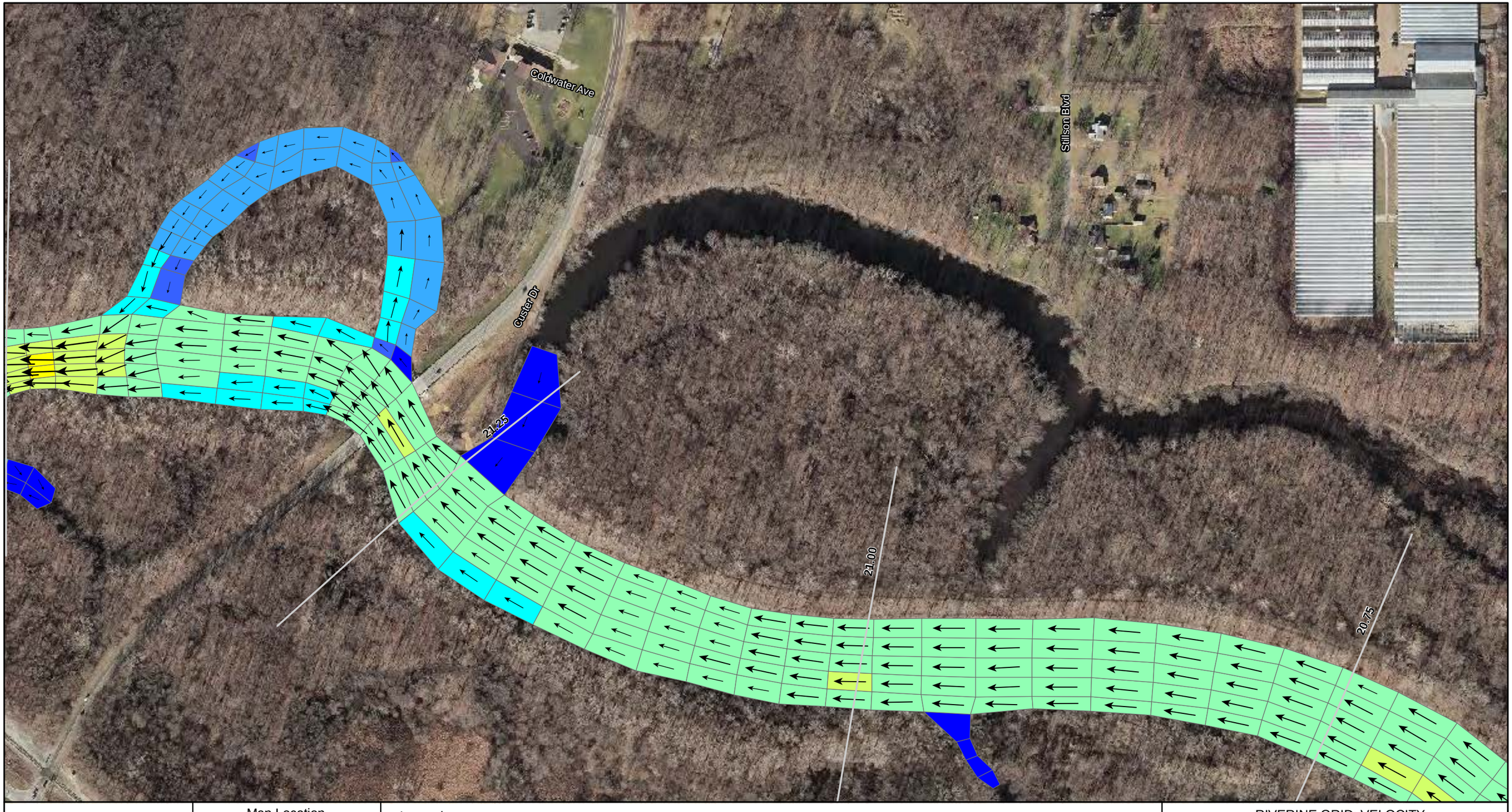
MP 19.90 - MP 20.75

SHEET 26 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May21_2011.mxd

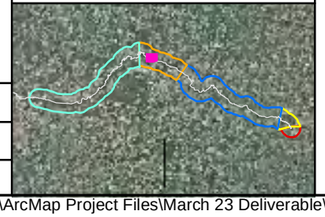
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

MP 20.70 - MP 21.50

SHEET 27 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May21_2011.mxd

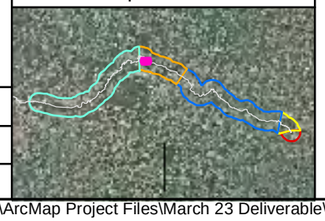
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

MP 21.35 - MP 22.15

SHEET 28 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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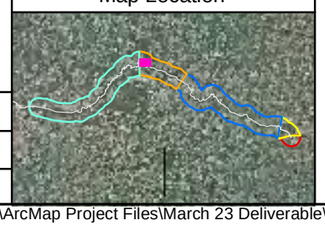
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

MP 22.15 - MP 22.90

SHEET 29 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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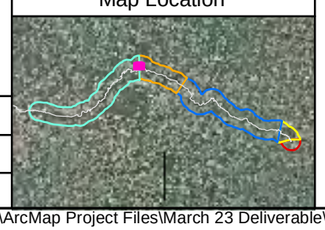
Aerial Photography Date: November 2011

San Juan Ave
Colorado St
Charleston Ave
Kalamazoo Ave
23.25
23.50
23.00
23.75
24.00

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

MP 22.80 - MP 24.10

SHEET 30 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

MP 24.10 - MP 24.85

SHEET 31 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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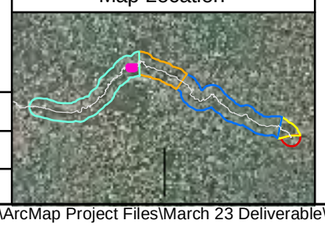
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

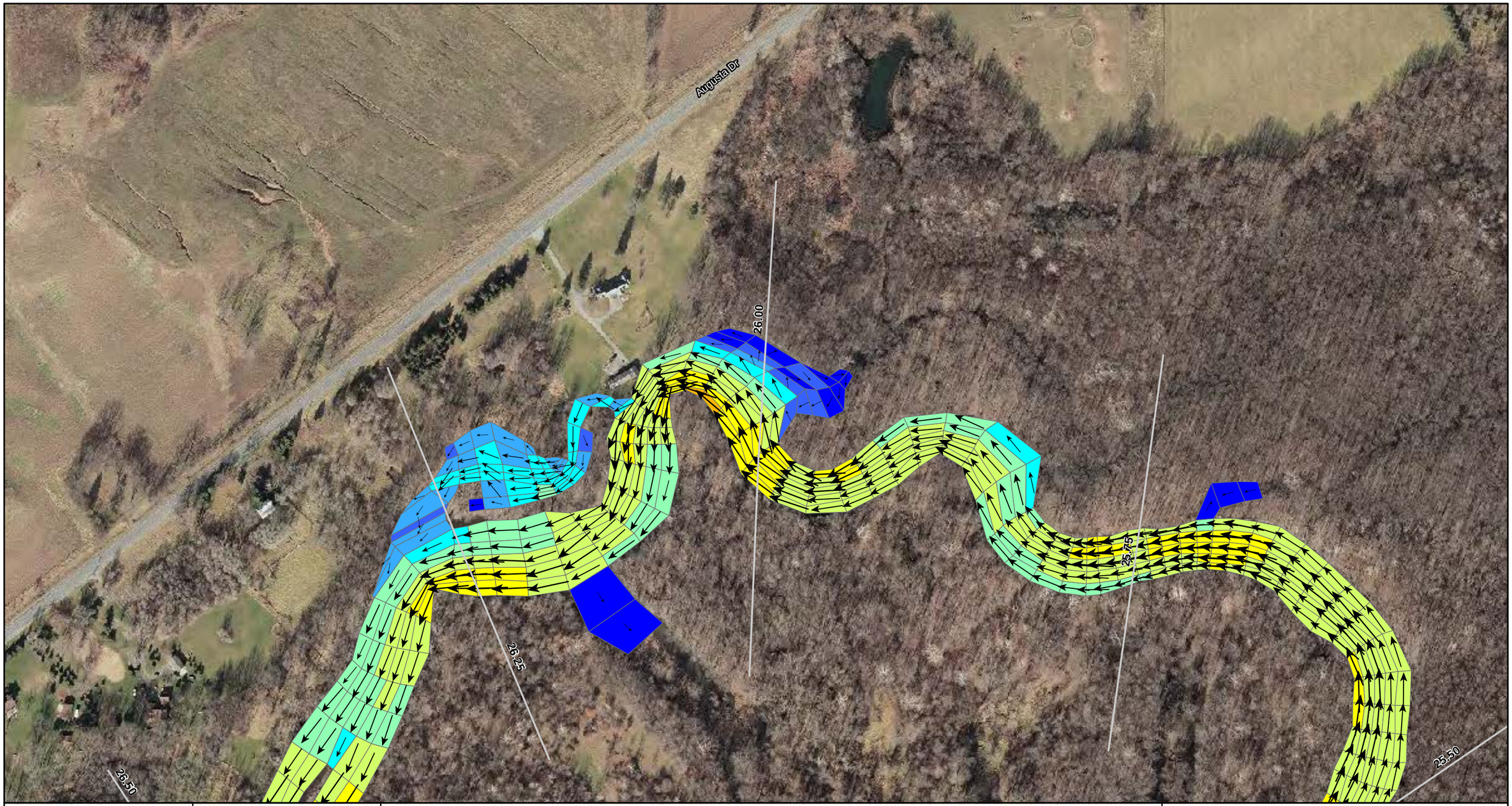
MP 24.80 - MP 25.65

SHEET 32 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

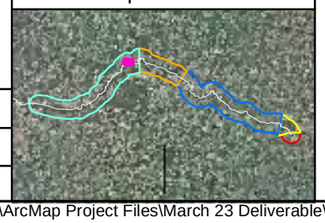
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Aerial Photography Date: November 2011



Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

MP 25.55 - MP 26.40

SHEET 33 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

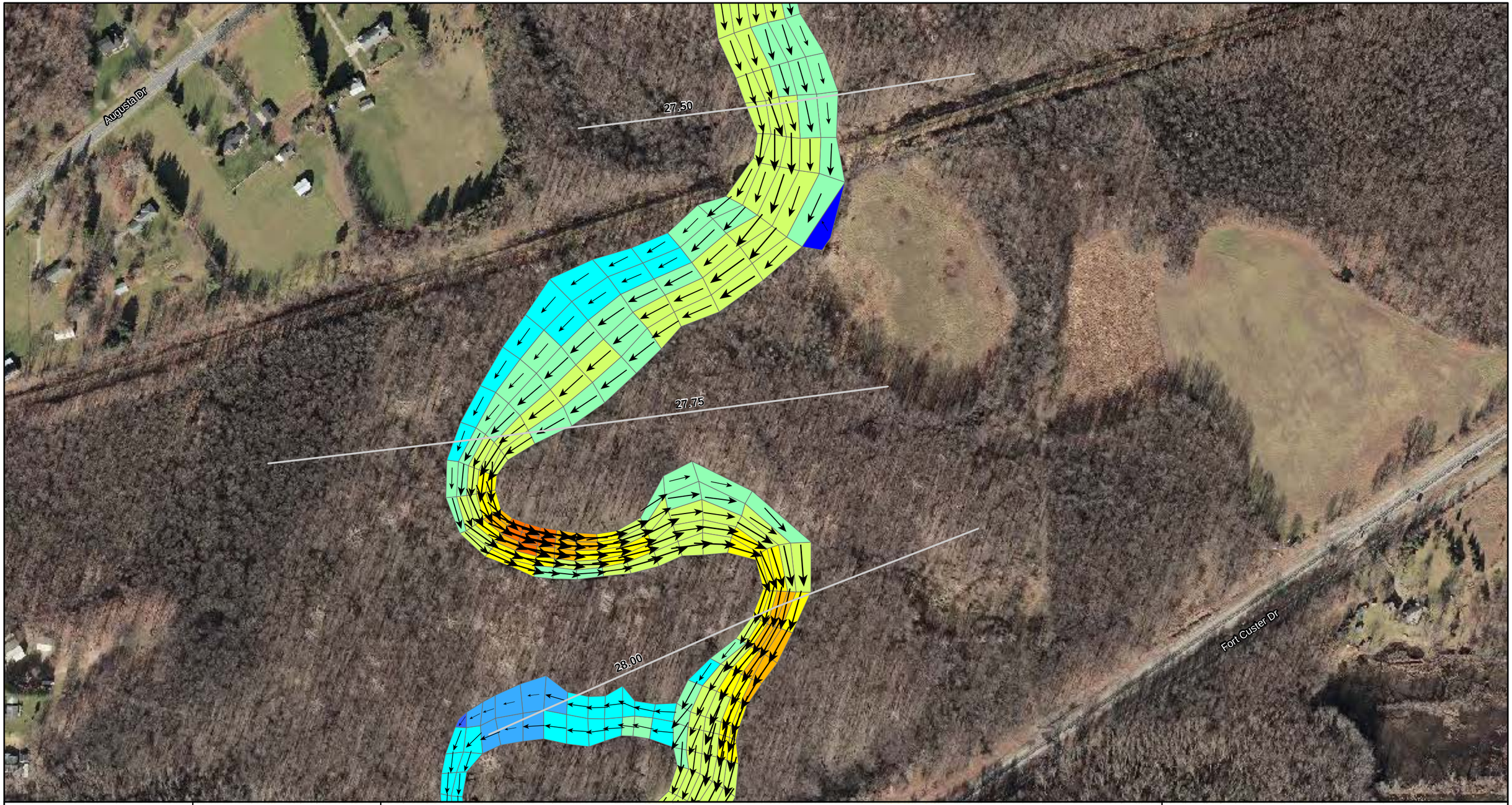
MP 26.40 - MP 27.45

SHEET 34 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May21_2011.mxd

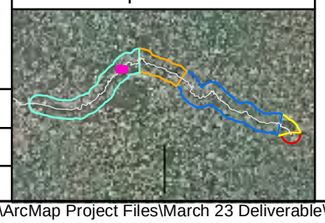
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

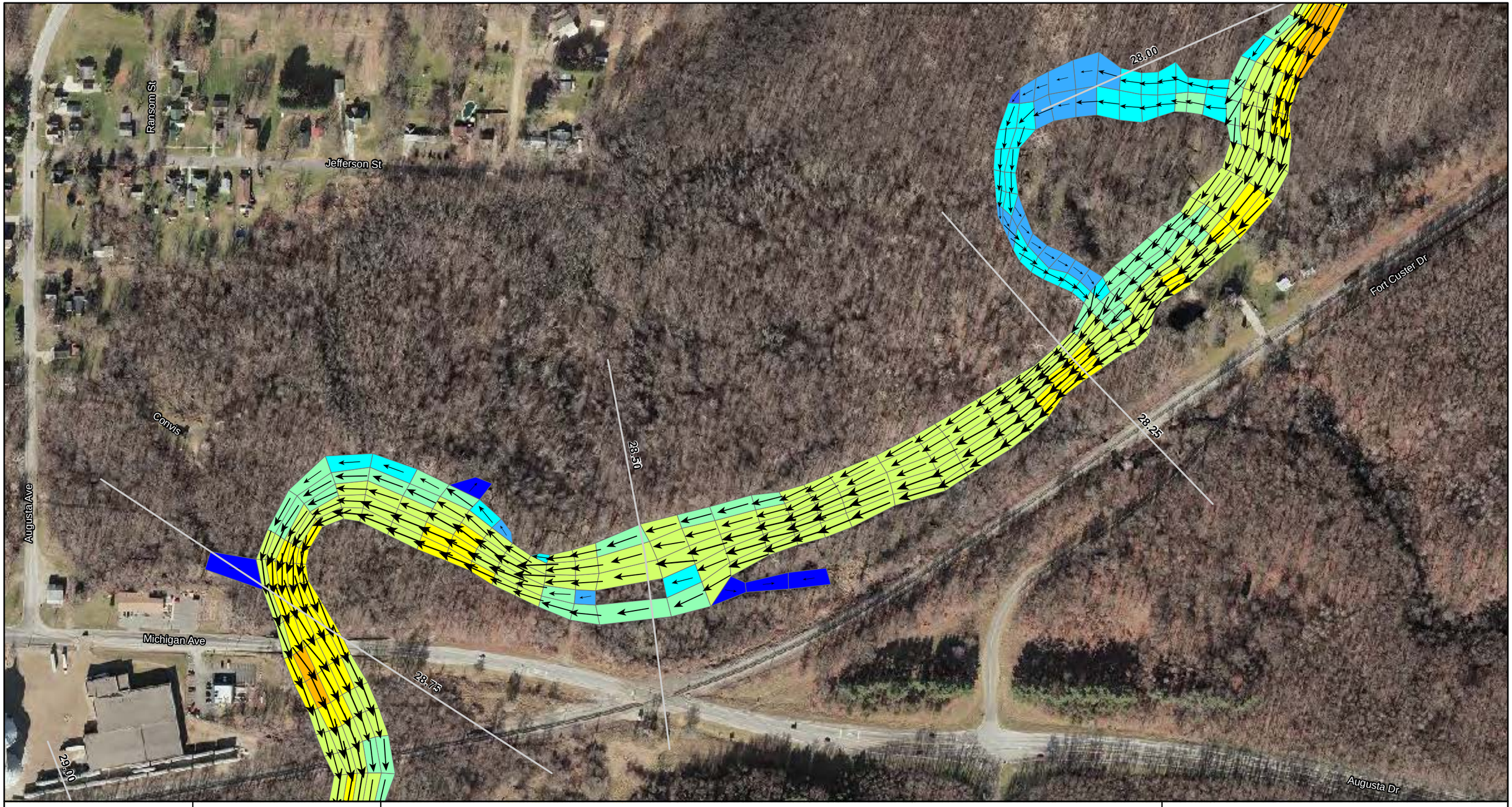
MP 27.45 - MP 28.10

SHEET 35 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May21_2011.mxd

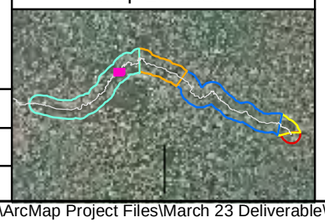
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

MP 28.05 - MP 28.85

SHEET 36 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

Clinton St
Clinton St
Chestnut St
Webster St
Church St
Fayette St
Cass St
Cherry St
Lincoln St
28.75
29.00
29.25
29.50
Augusta Climax Rd
Fort Custer Rec Area Access

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

MP 28.85 - MP29.55

SHEET 37 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

29.50

29.75

Fort Custer Rec Area Service

Fort Custer Rec Area Access

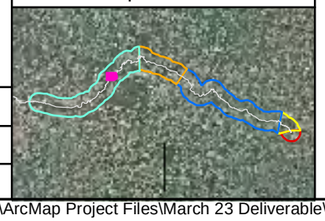
30.00

30.25

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

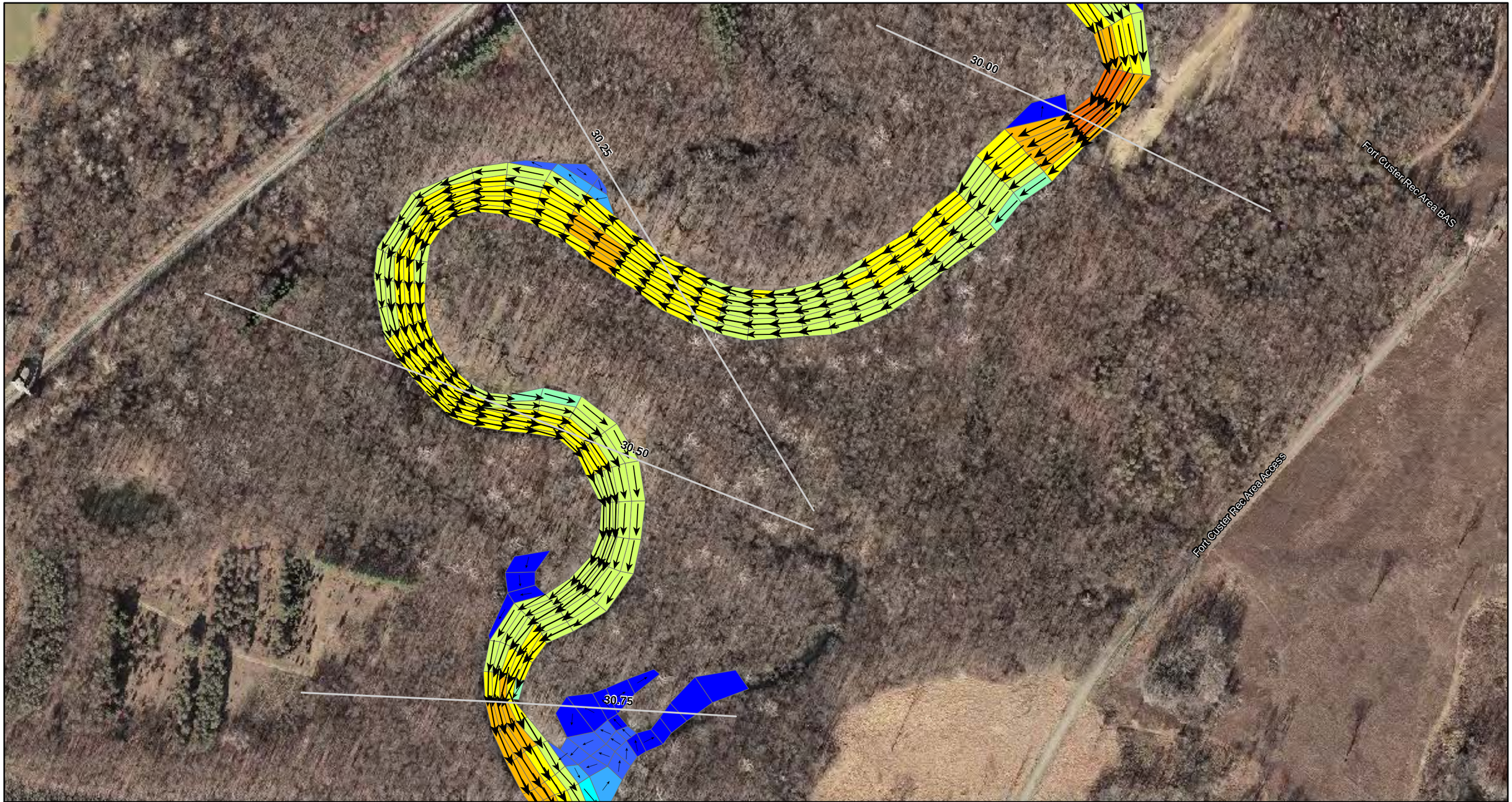
MP 29.50 - MP29.95

SHEET 38 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

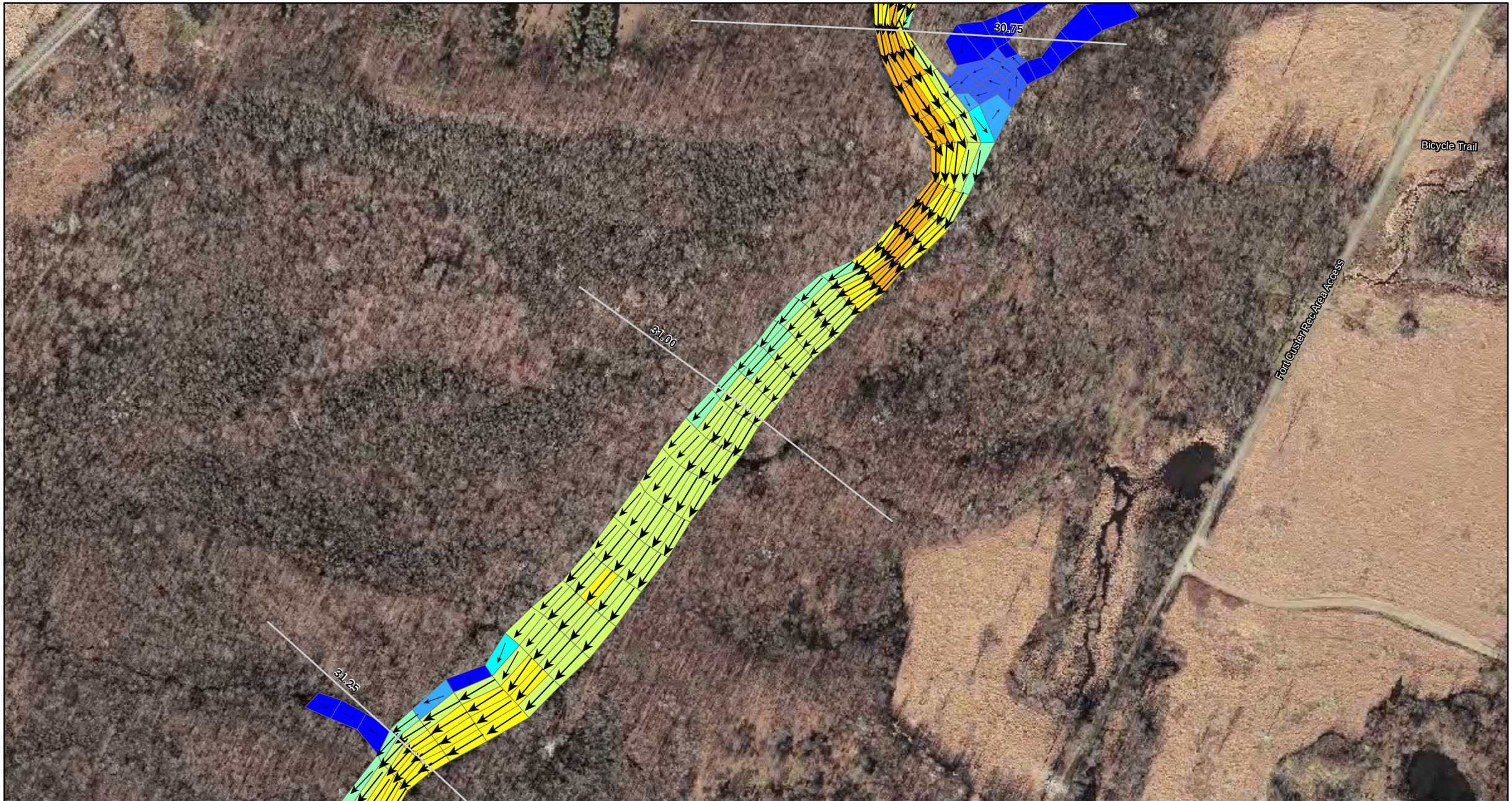
MP 29.95 - MP 30.80

SHEET 39 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

MP 30.75 - MP 31.25

SHEET 40 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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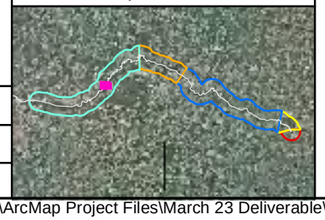
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

MP 31.25 - MP 31.70

SHEET 41 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

31.75

32.00

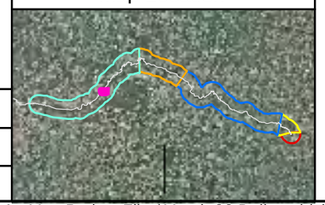
32.25

Bicycle Trail

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

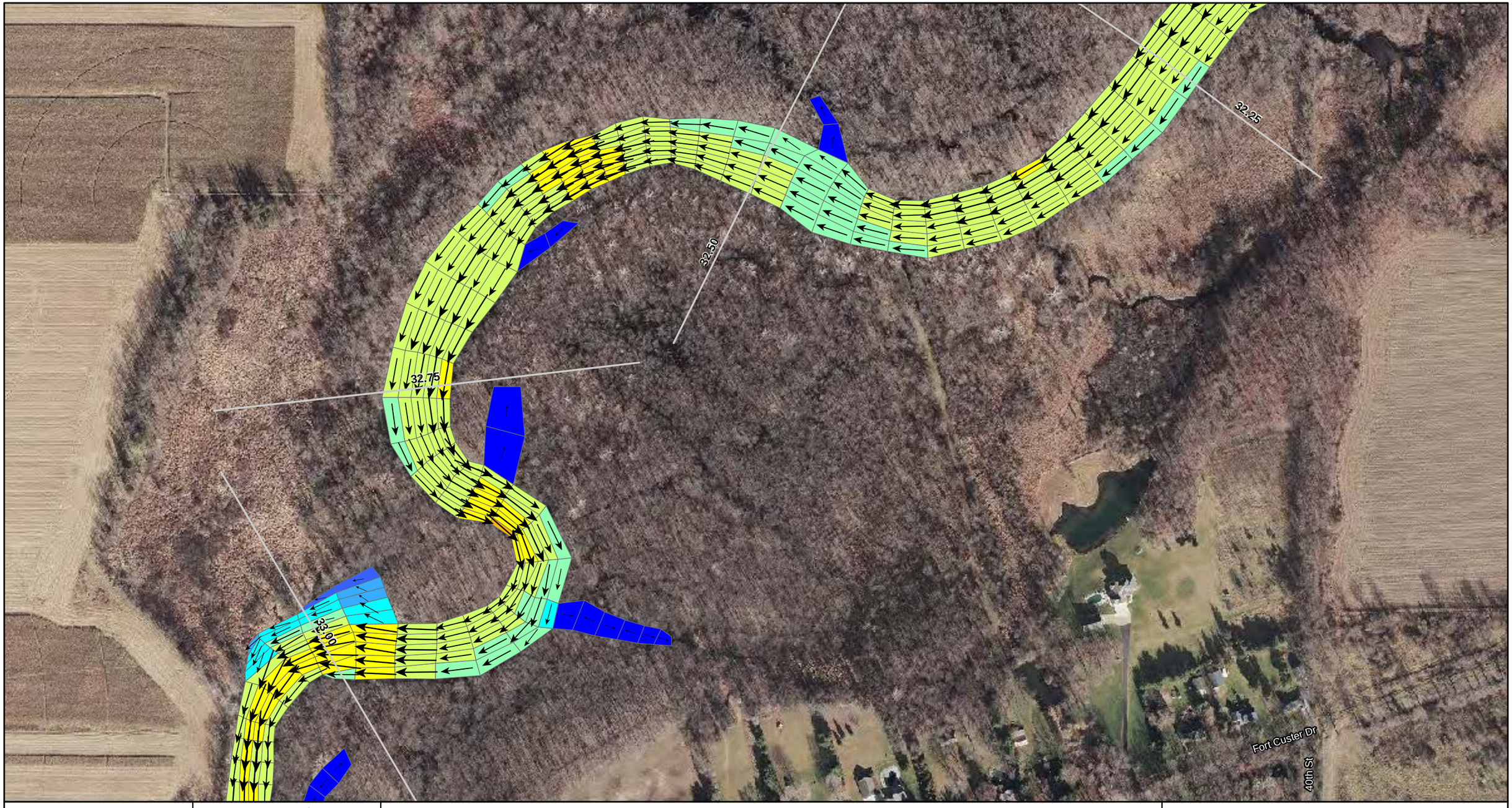
MP 31.65 - MP 32.25

SHEET 42 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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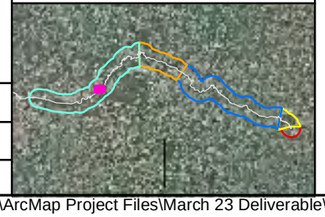
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

MP 32.25 - MP 33.10

SHEET 43 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

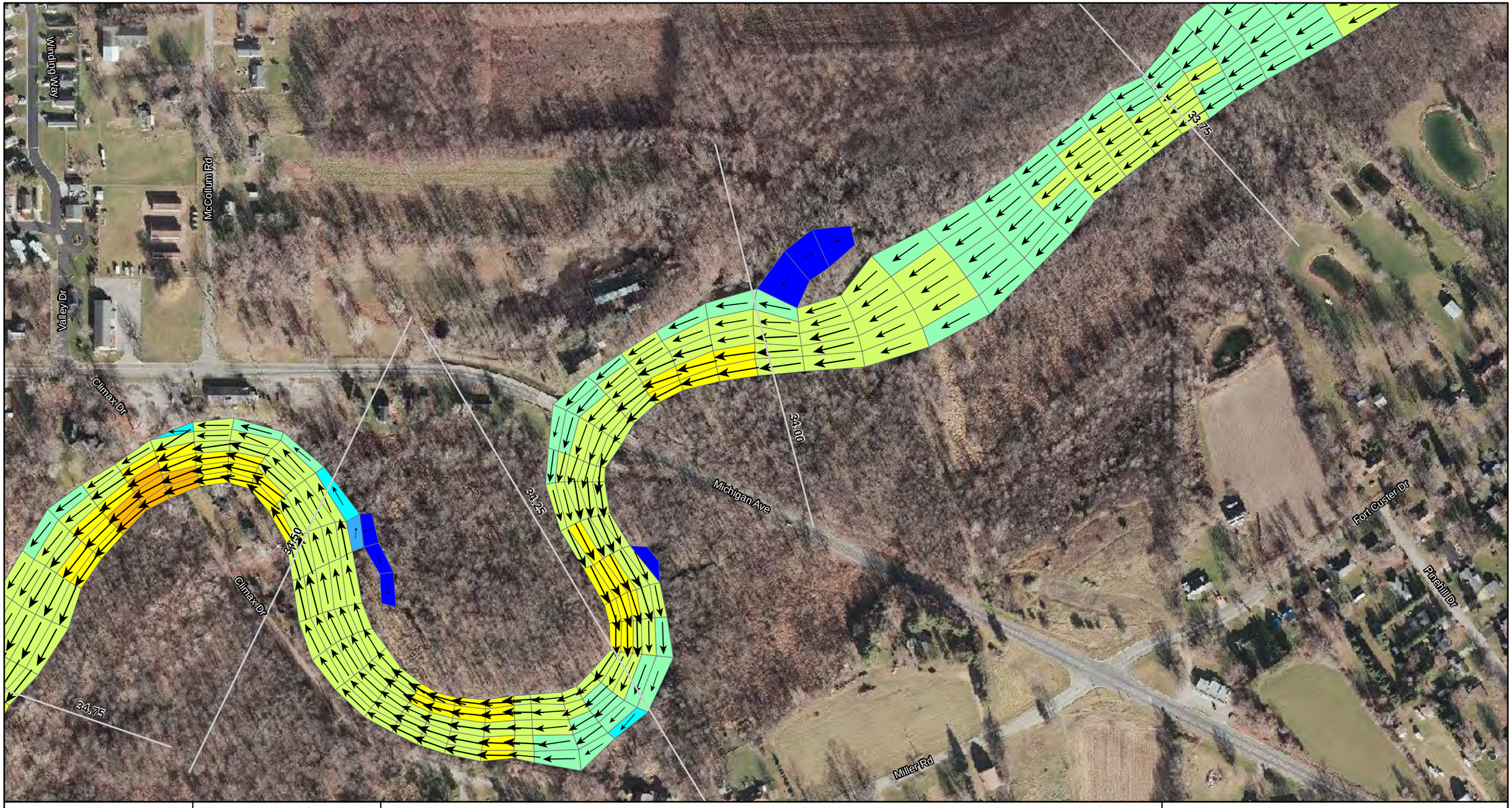
MP 33.10 - MP 33.70

SHEET 44 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May21_2011.mxd

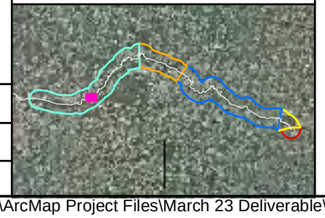
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

MP 33.70 - MP 34.70

SHEET 45 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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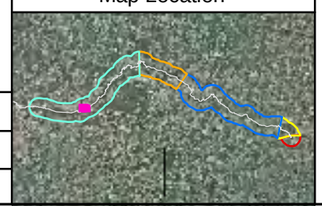
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

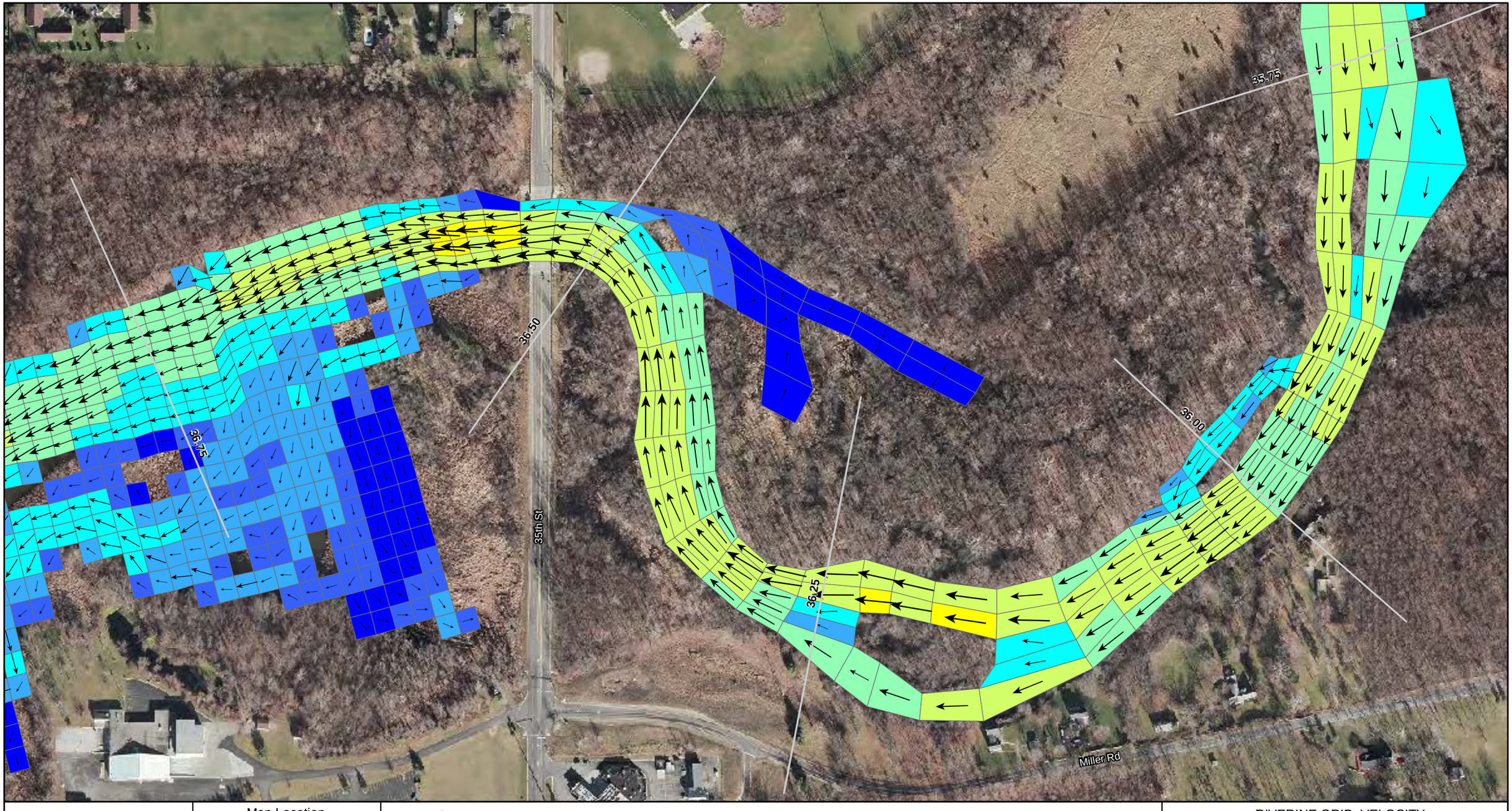
MP 34.70 - MP 35.75

SHEET 46 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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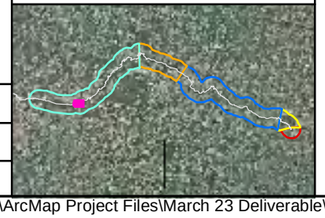
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

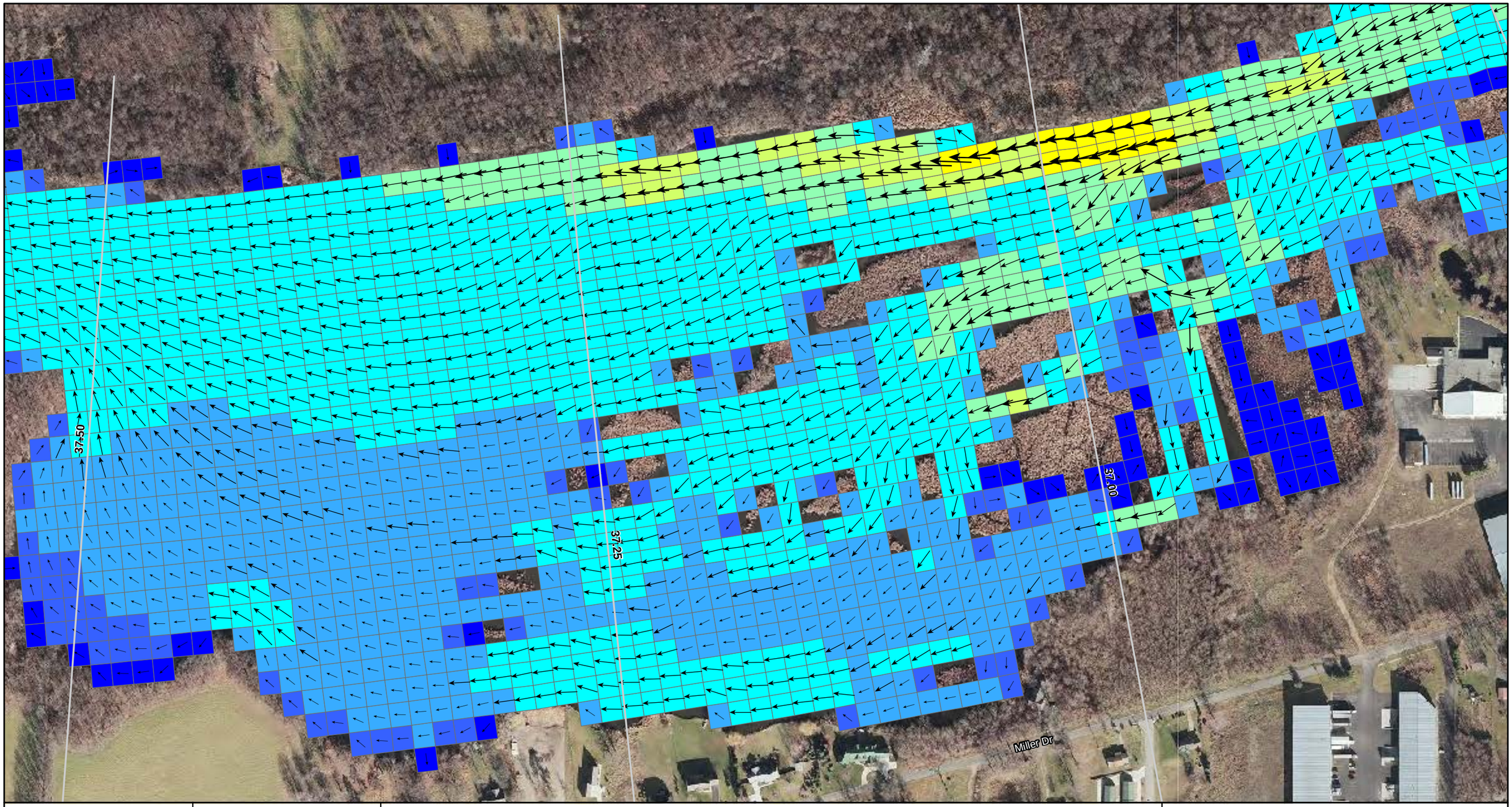
MP 35.75 - MP 36.80

SHEET 47 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May21_2011.mxd

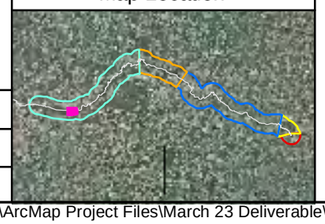
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

MP 36.80 - MP 37.55

SHEET 48 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

38.25

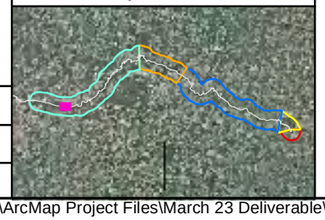
38.00

37.75

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

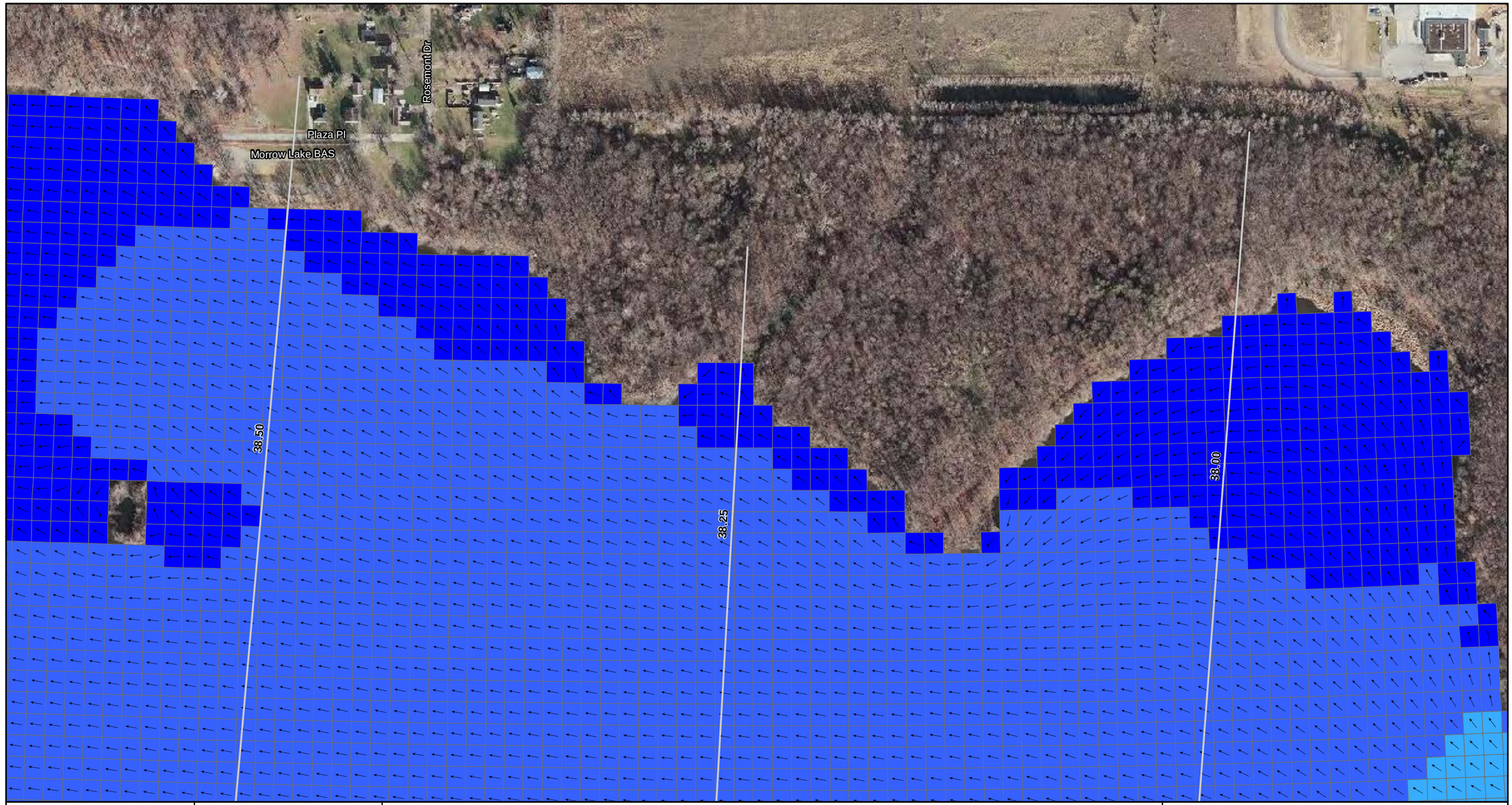
MP 37.55 - MP 38.30

SHEET 49 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May21_2011.mxd

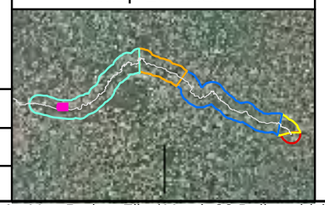
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

MP 37.80 - MP 38.60N

SHEET 50 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

38.50

38.25

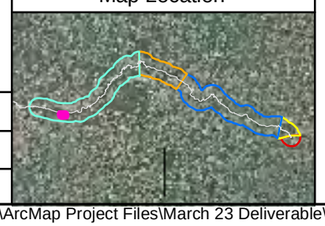
38.00

Lyth Rd

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

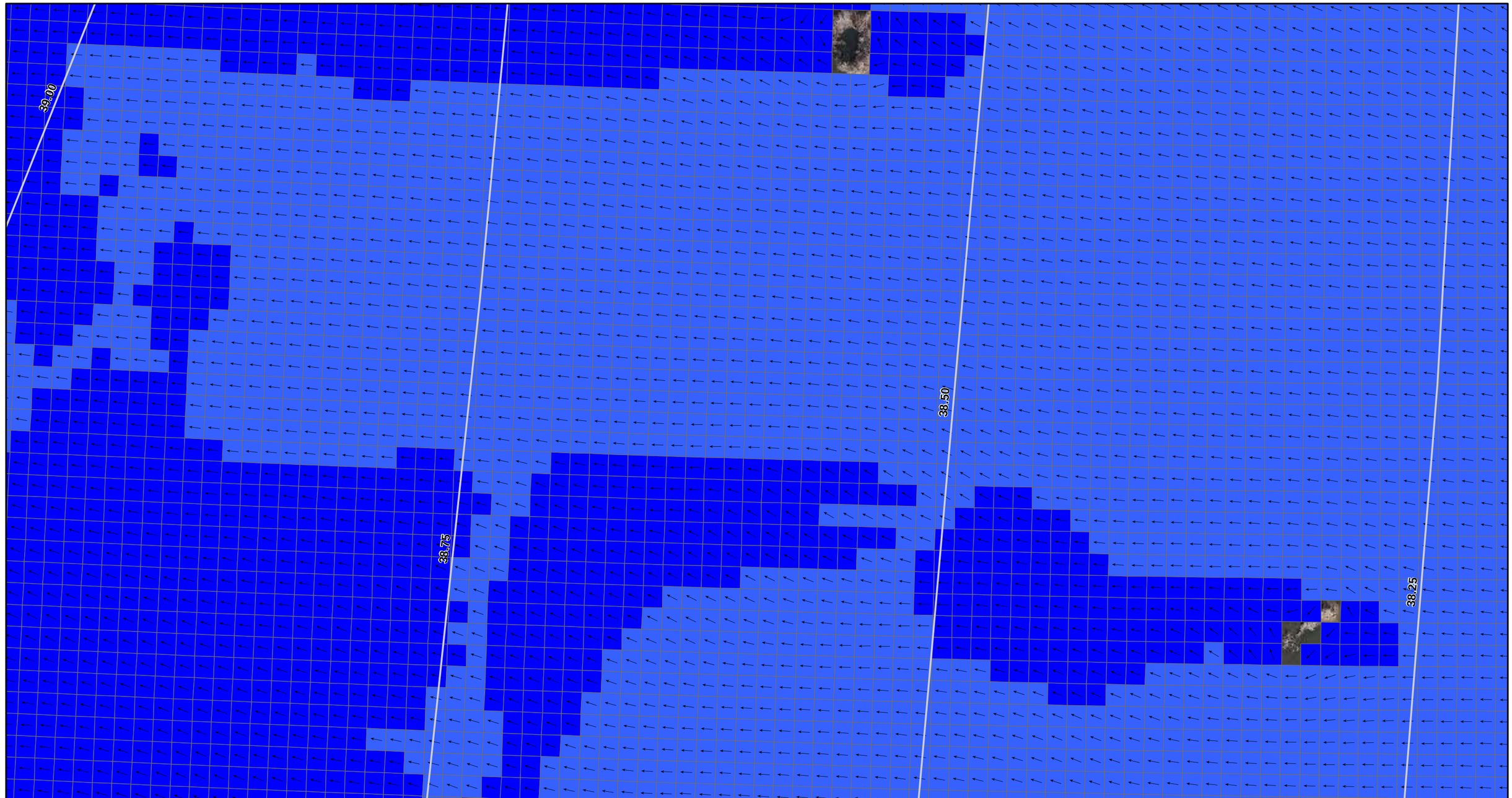
MP 37.80 - MP 38.60S

SHEET 51 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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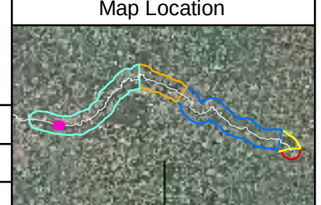
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

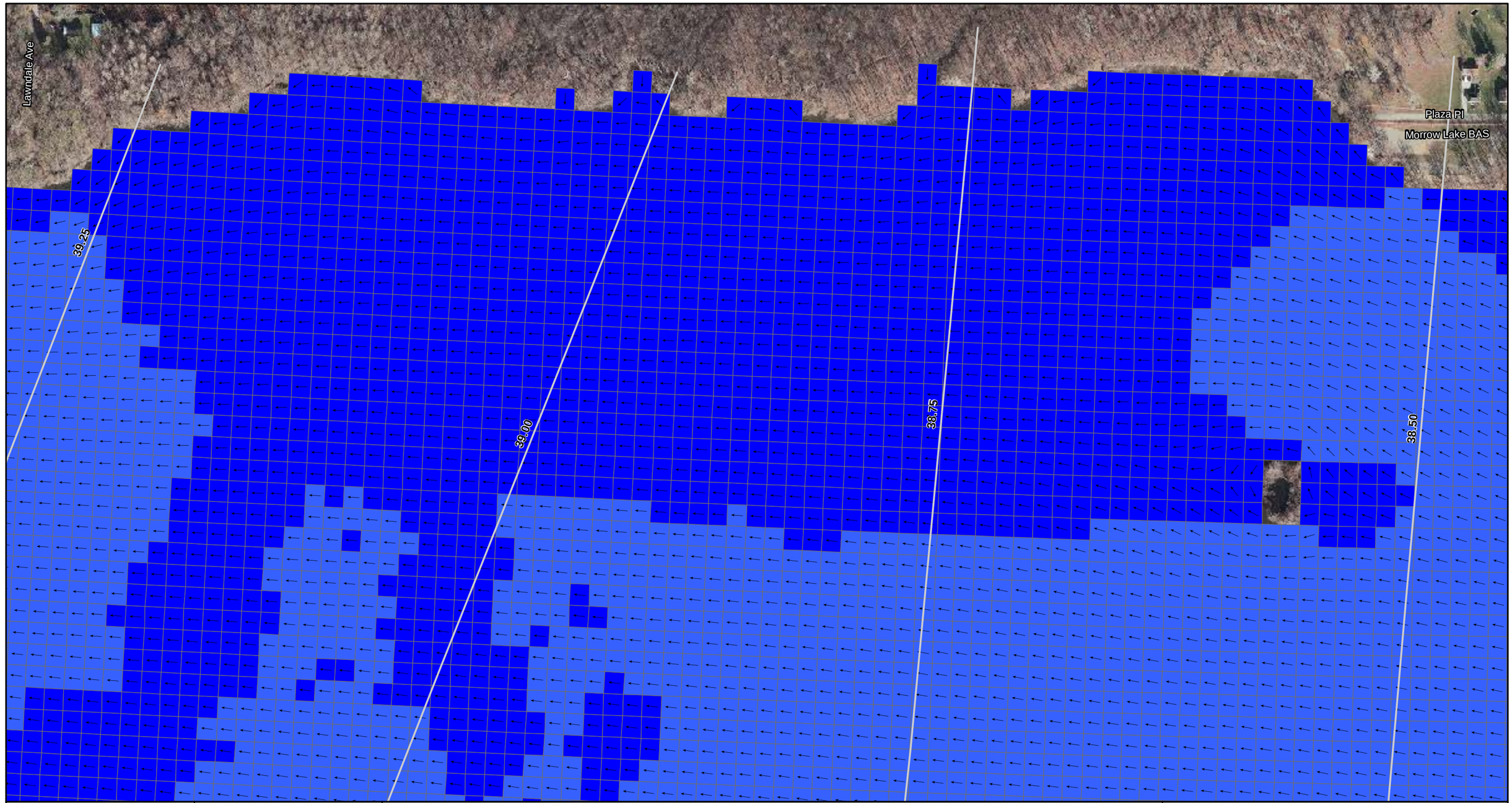
MP 38.25 - MP 39.00C

SHEET 52 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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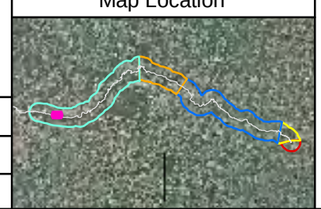
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

MP 38.50 - MP 39.25N

SHEET 53 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May21_2011.mxd

Aerial Photography Date: November 2011

39.25

39.00

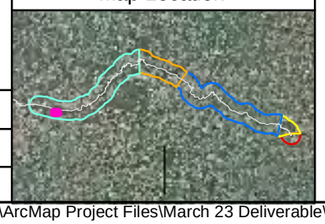
38.75

38.50

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

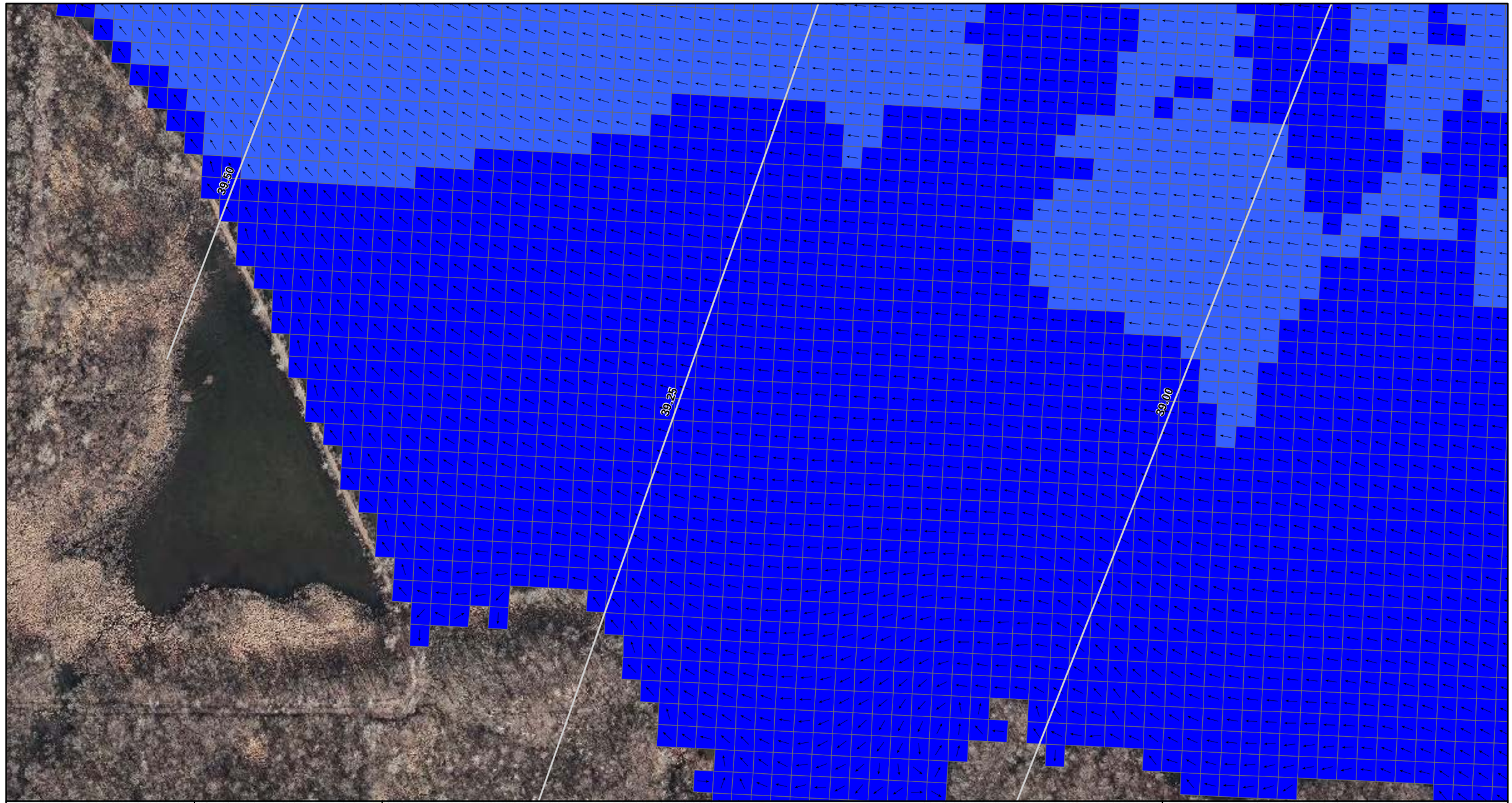
MP 38.50 - MP 39.25S

SHEET 54 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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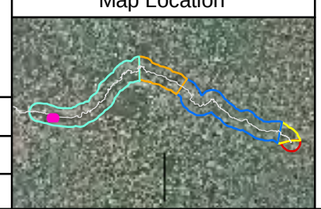
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

MP 38.90 - MP 39.60S

SHEET 55 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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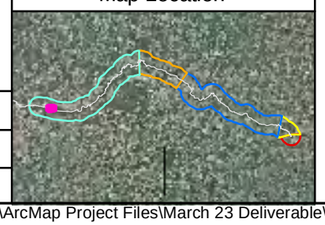
Aerial Photography Date: November 2011

Morrow St
Elliot Rd
Lawndale Ave
Chene Dr
39.50
39.25
39.75
Consumers Power Dr

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 21, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 21, 2011

MP 39.15 - MP 39.85

SHEET 56 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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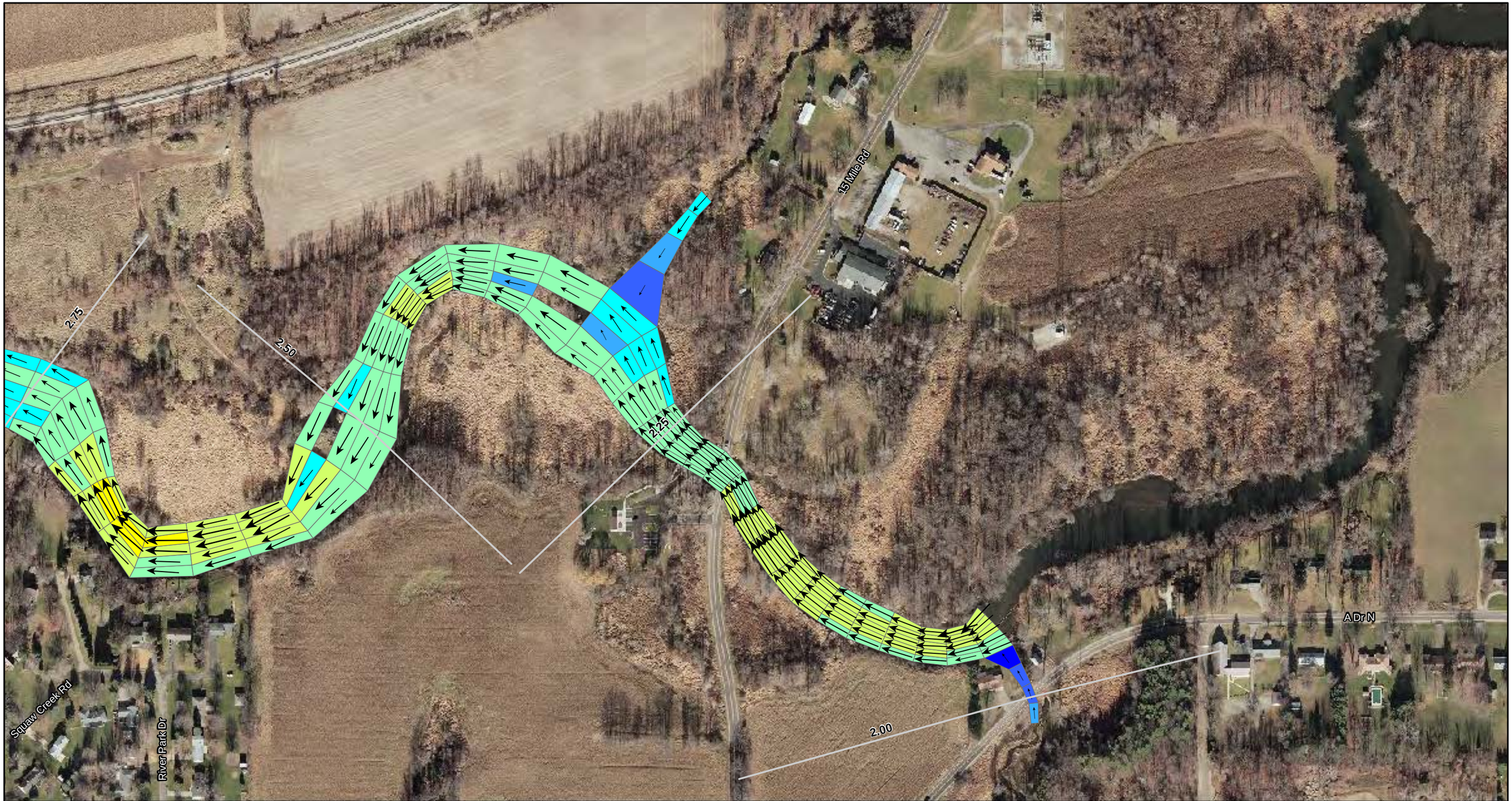
Aerial Photography Date: November 2011

Figure 5-9

Riverine Grid: Velocity

May 23, 2011

Sheets 1 through 56



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

MP 01.95 - MP 02.75

SHEET 1 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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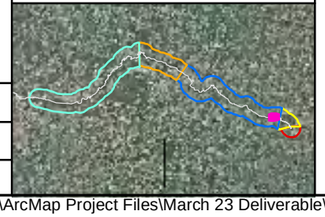
Aerial Photography Date: November 2011

3.25
3.00
2.75
2.50
Friendship Ln
Heather Dr
Peter Pan Ln
Kristen Dr
Squaw Creek Rd
River Park Dr

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

MP 02.60 - MP 03.40

SHEET 2 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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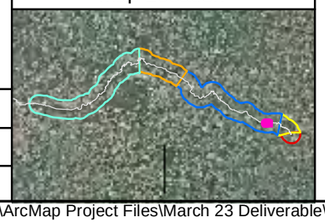
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

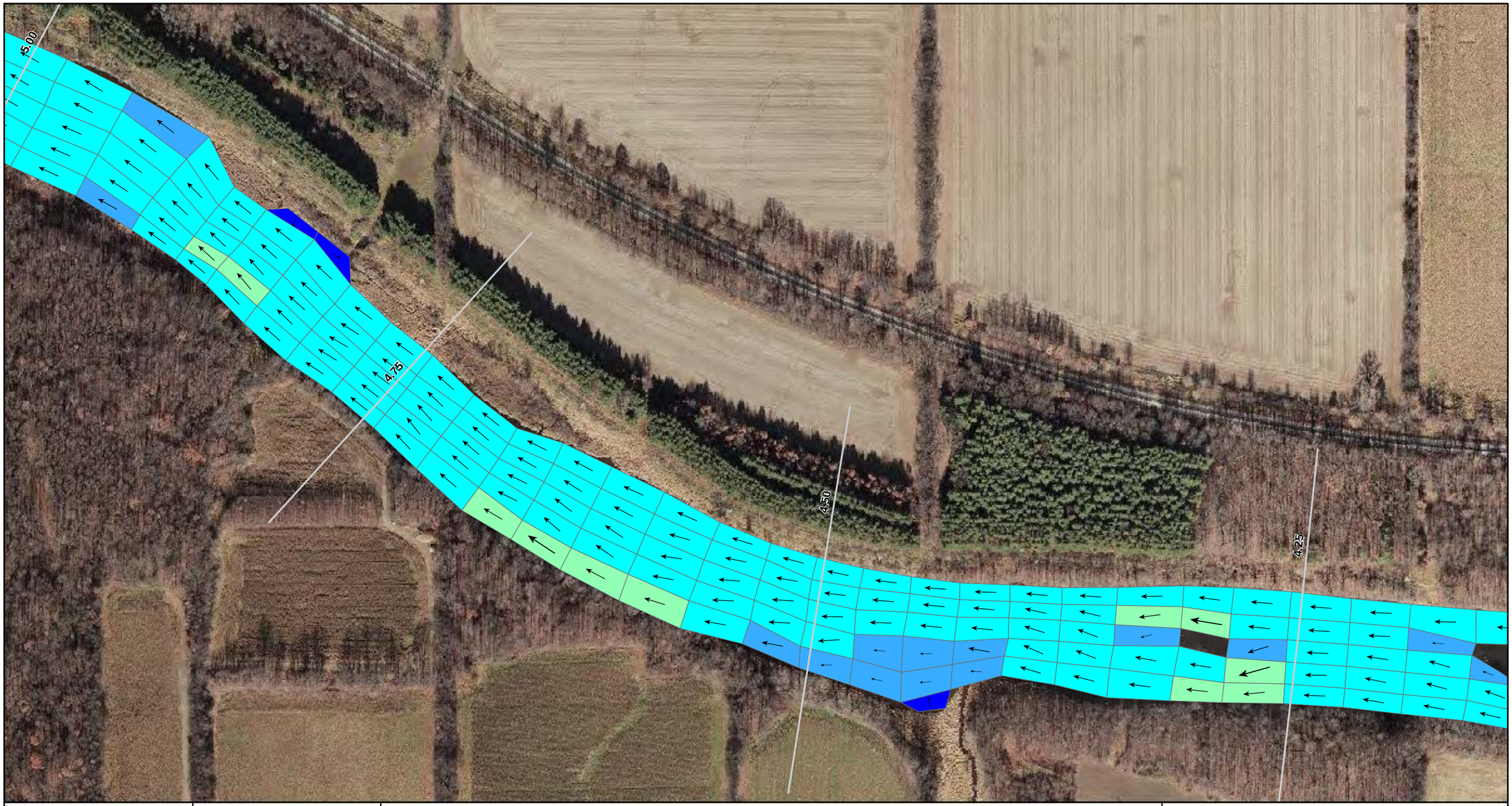
MP 03.40 - MP 04.20

SHEET 3 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

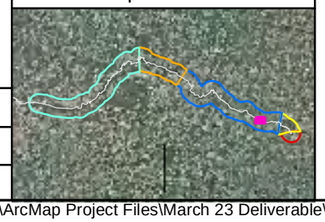
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Aerial Photography Date: November 2011



Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

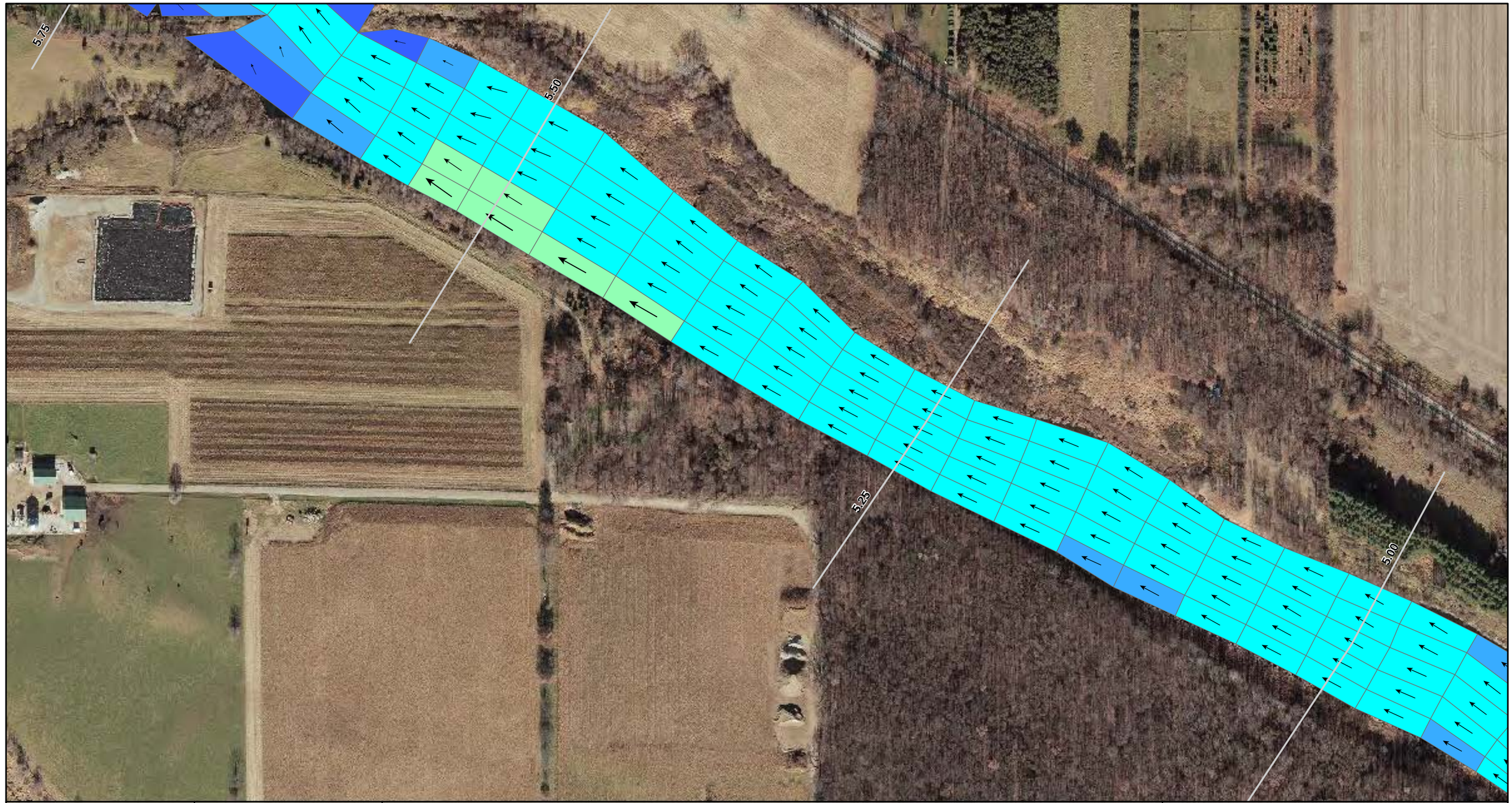
MP 04.15 - MP 05.00

SHEET 4 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

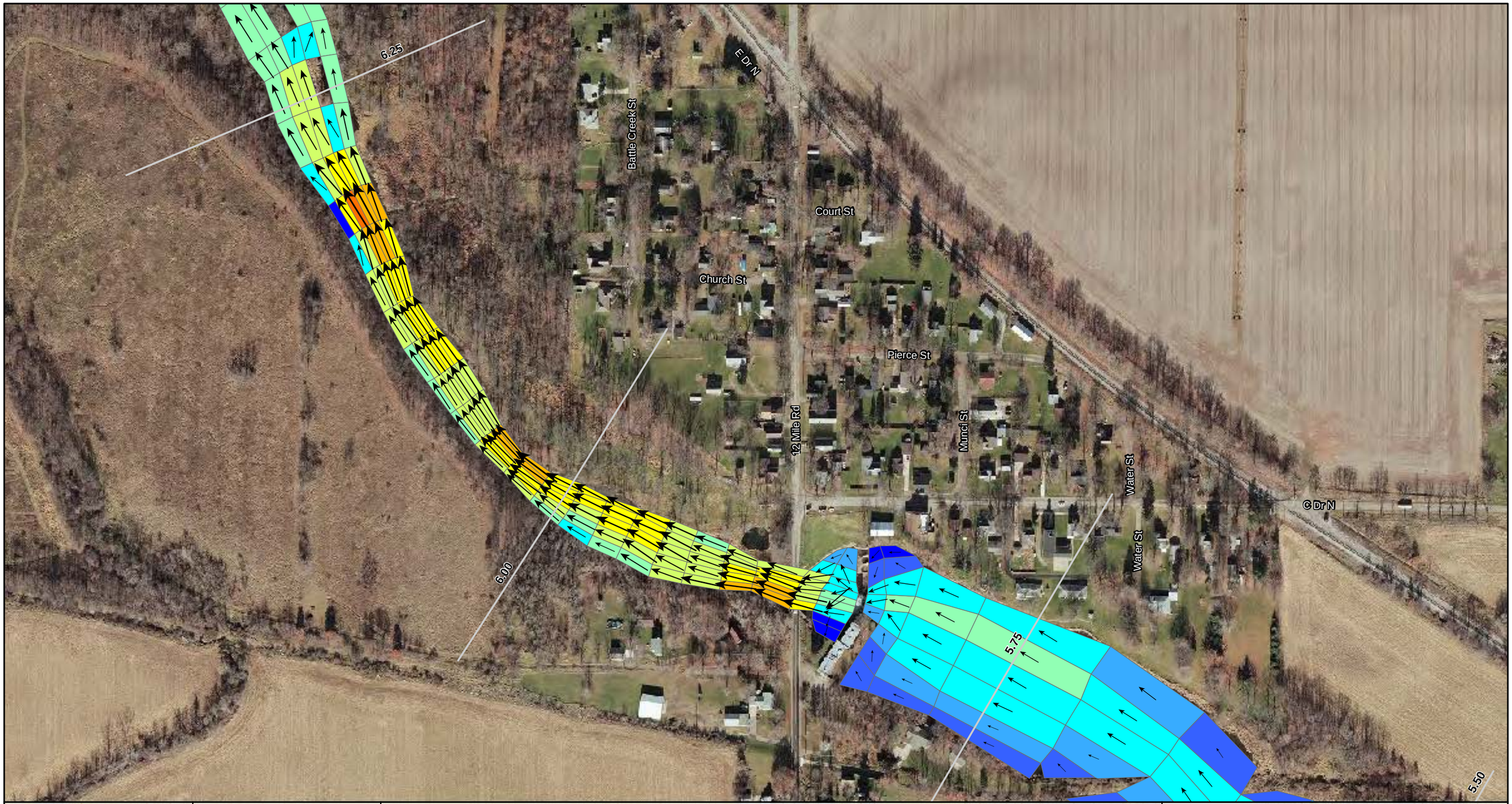
MP 04.90 - MP 05.65

SHEET 5 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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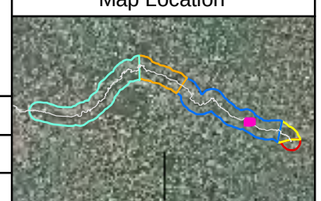
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

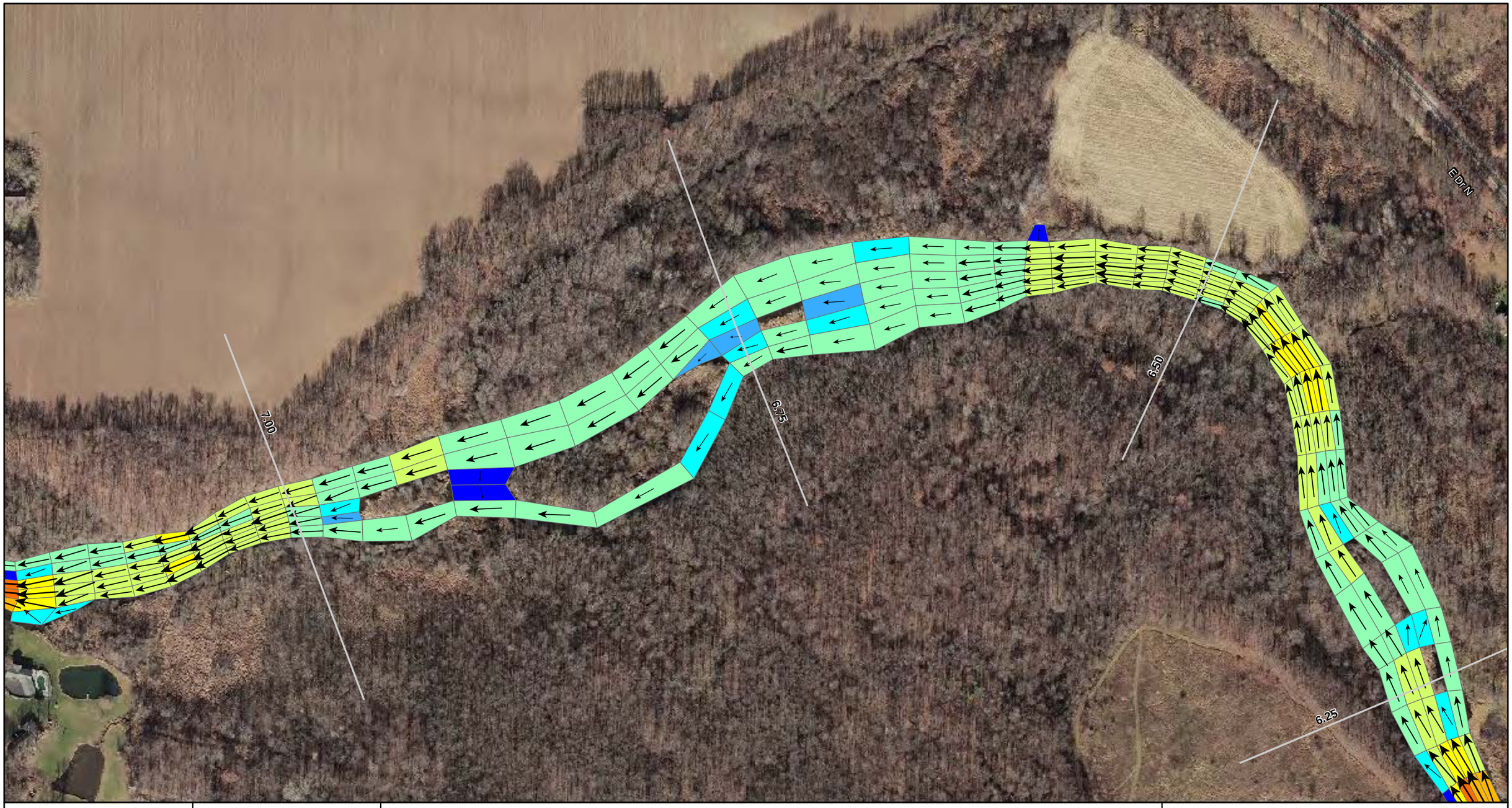
MP 05.65 - MP 06.30

SHEET 6 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May23_2011.mxd

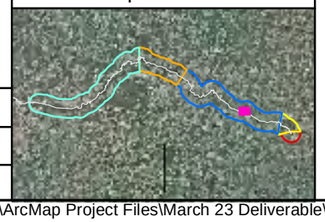
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

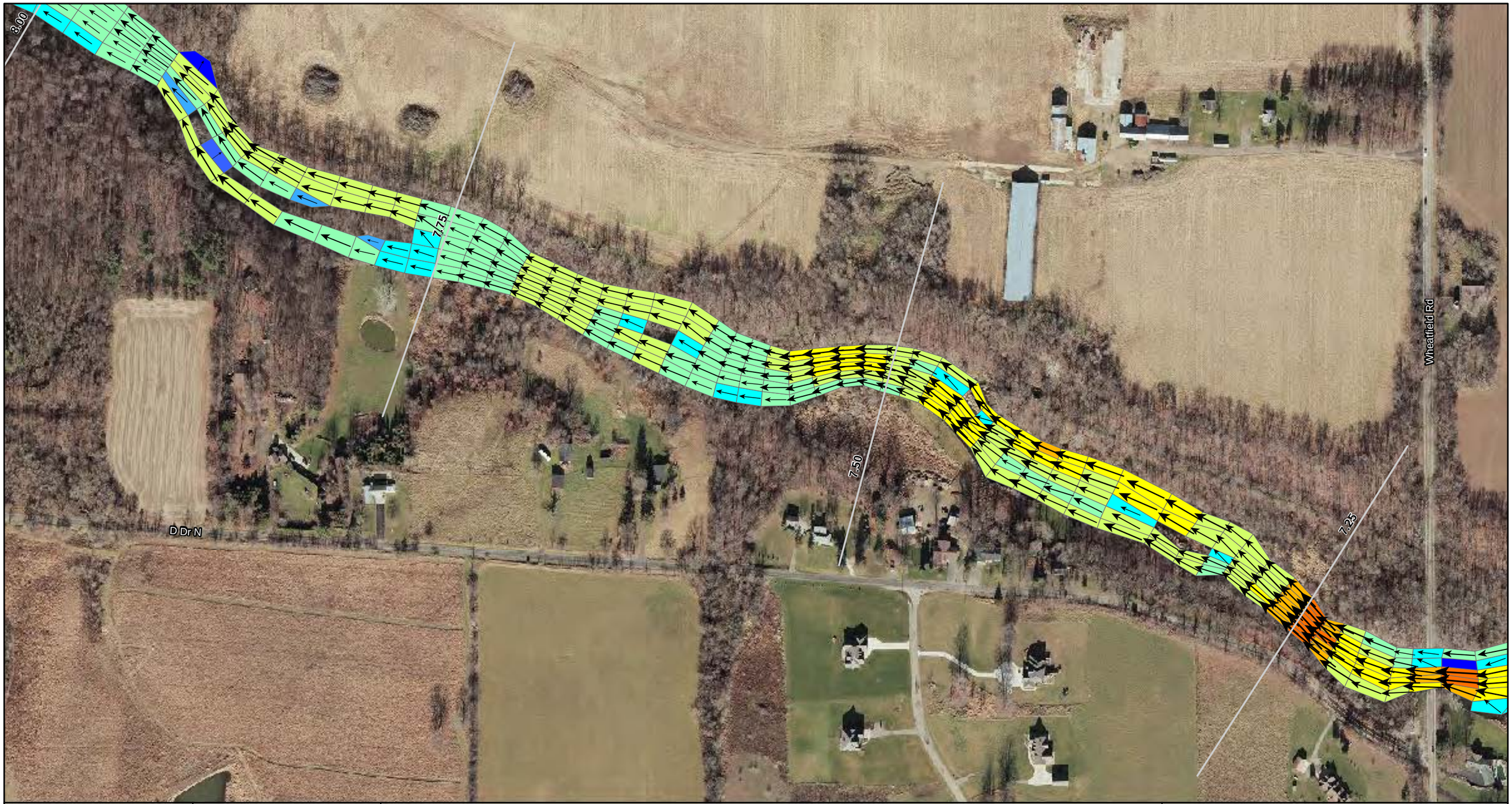
MP 06.20 - MP 07.15

SHEET 7 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May23_2011.mxd

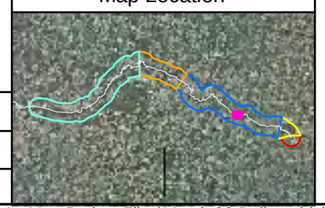
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

MP 07.15 - MP 07.95

SHEET 8 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

8.75

8.50

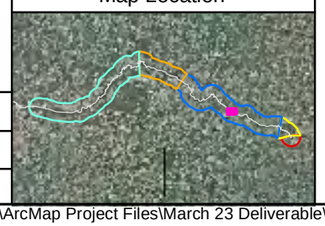
8.25

8.00

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

MP 07.90 - MP 08.75

SHEET 9 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

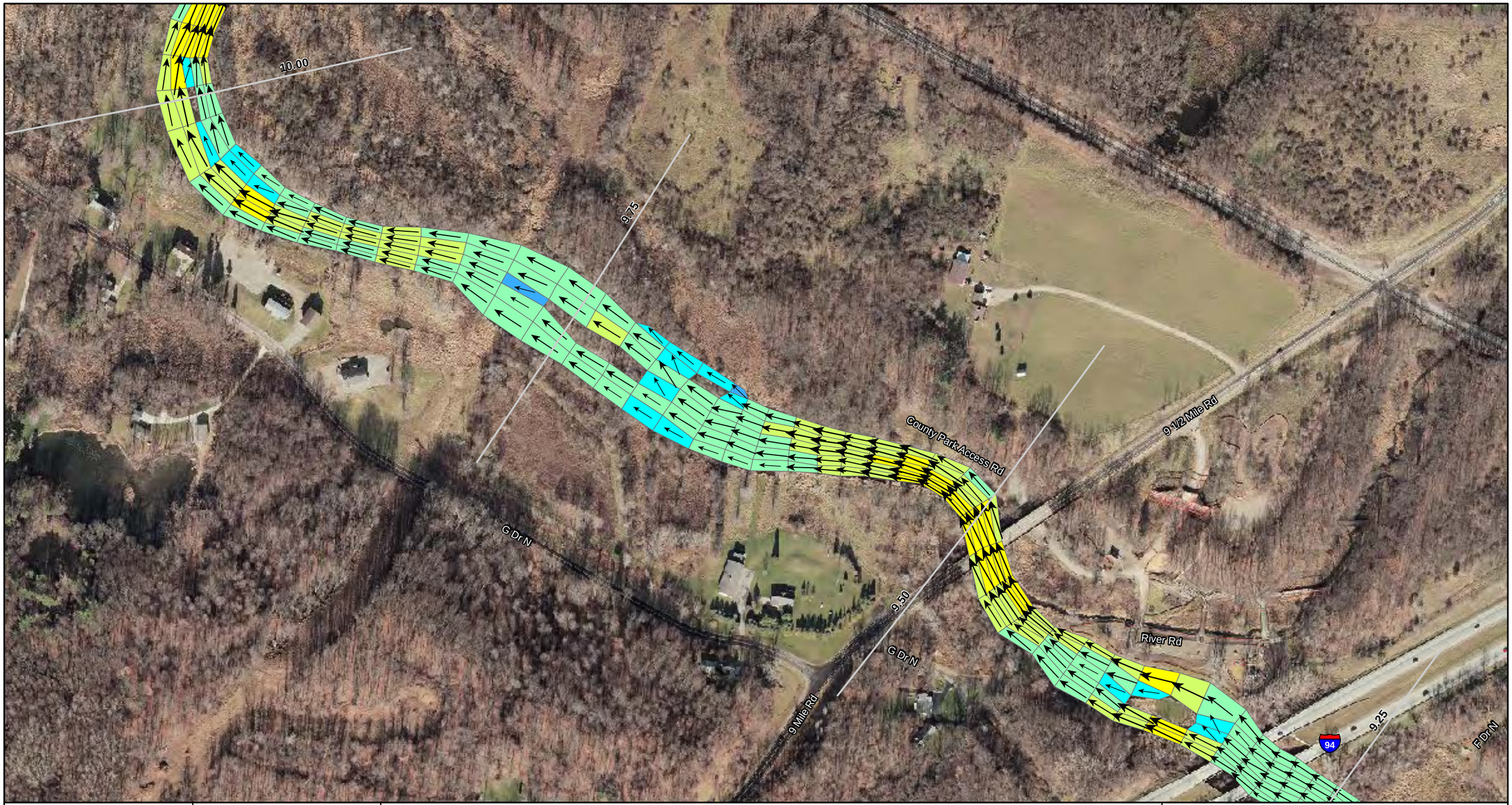
MP 08.70 - MP 09.30

SHEET 10 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

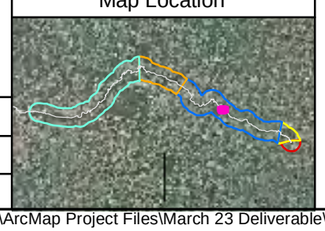
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May23_2011.mxd

Aerial Photography Date: November 2011



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

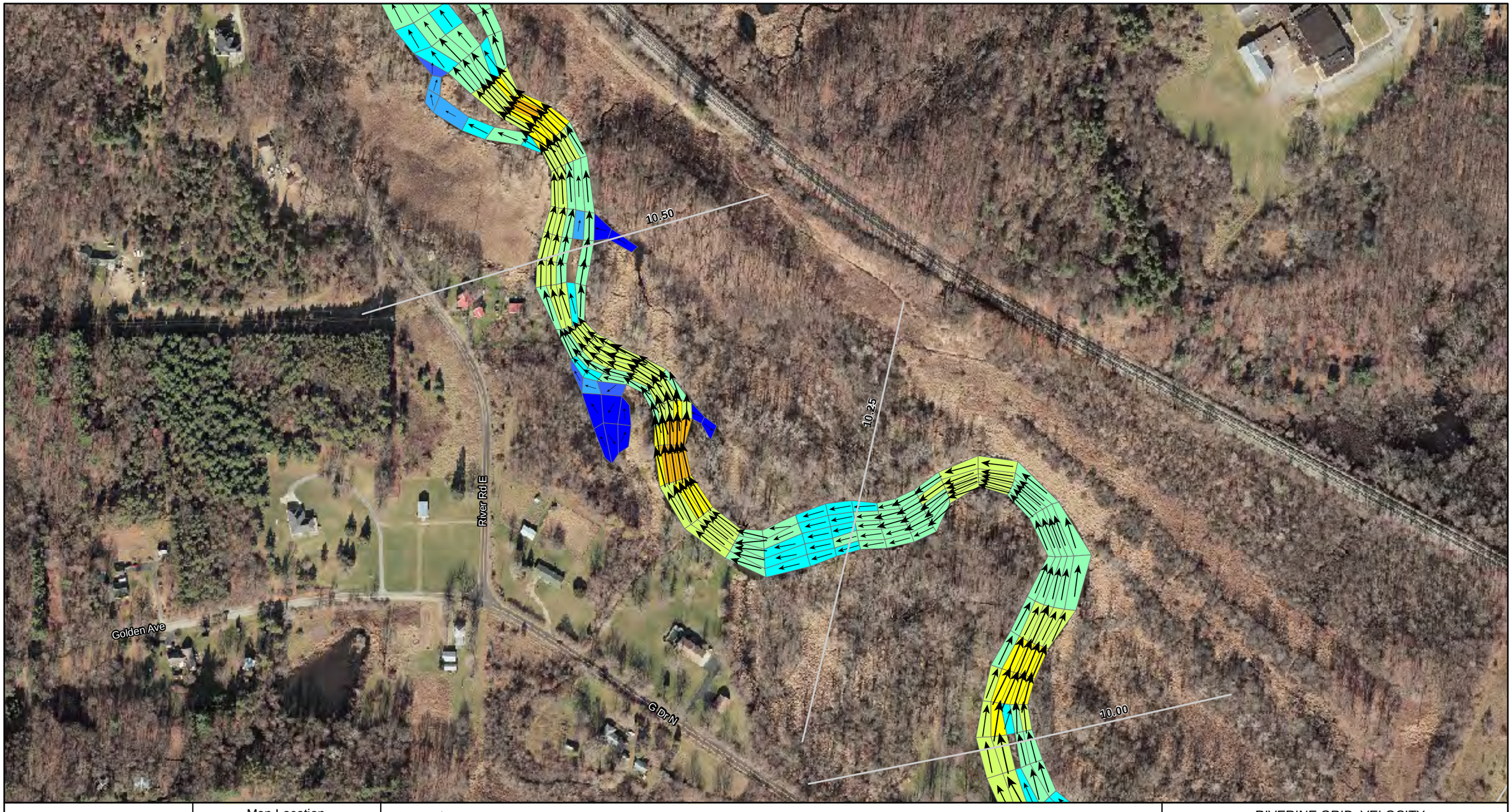
MP 09.25 - MP 10.05

SHEET 11 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

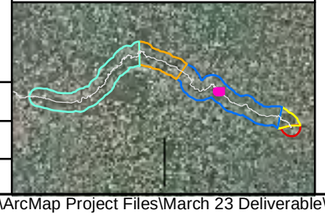
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May23_2011.mxd

Aerial Photography Date: November 2011



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

MP 10.00 - MP 10.65

SHEET 12 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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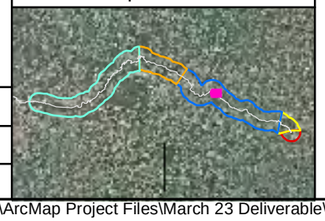
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

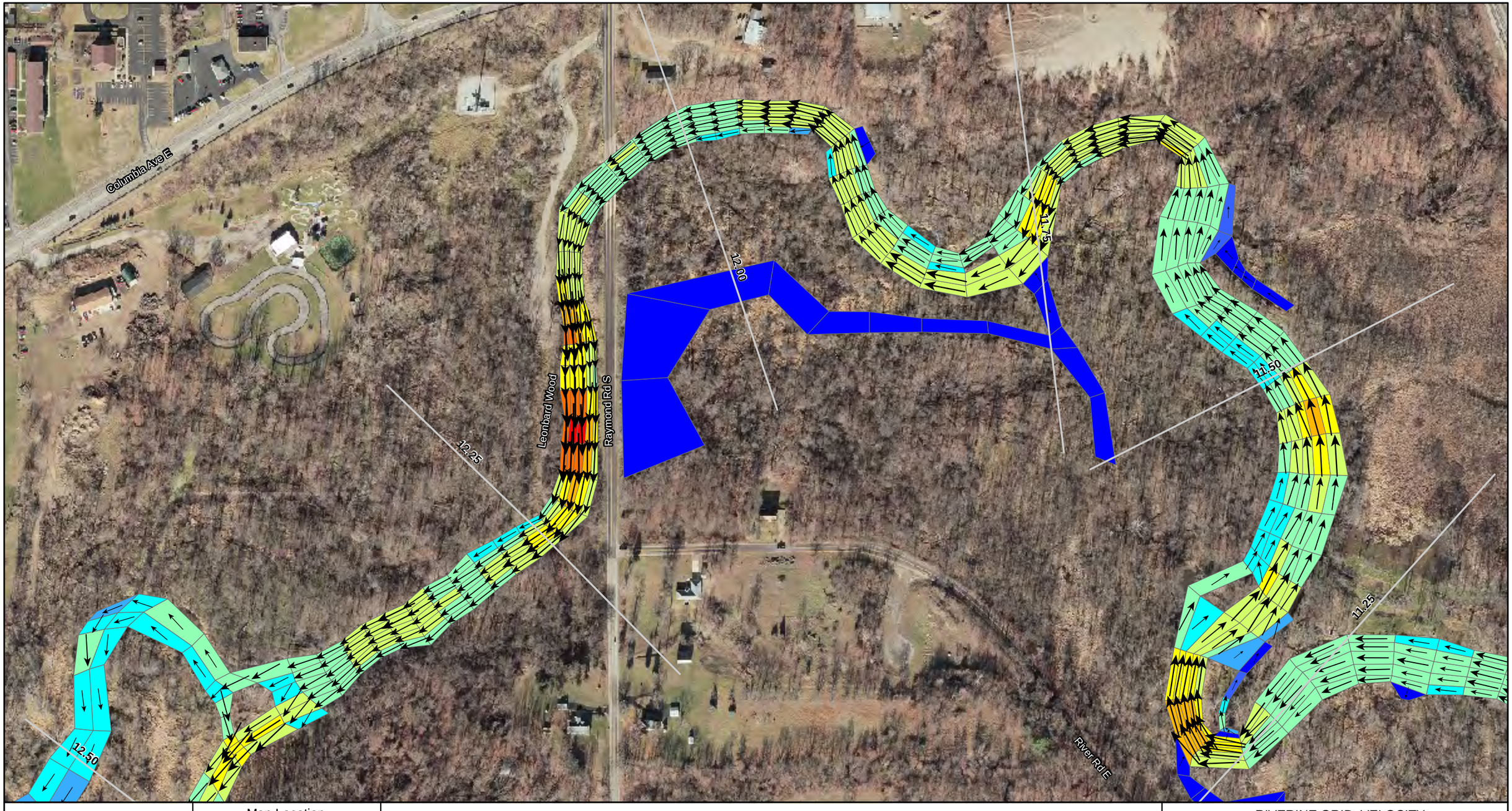
MP 10.60 - MP 11.40

SHEET 13 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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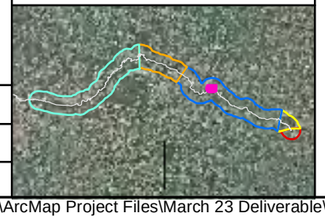
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

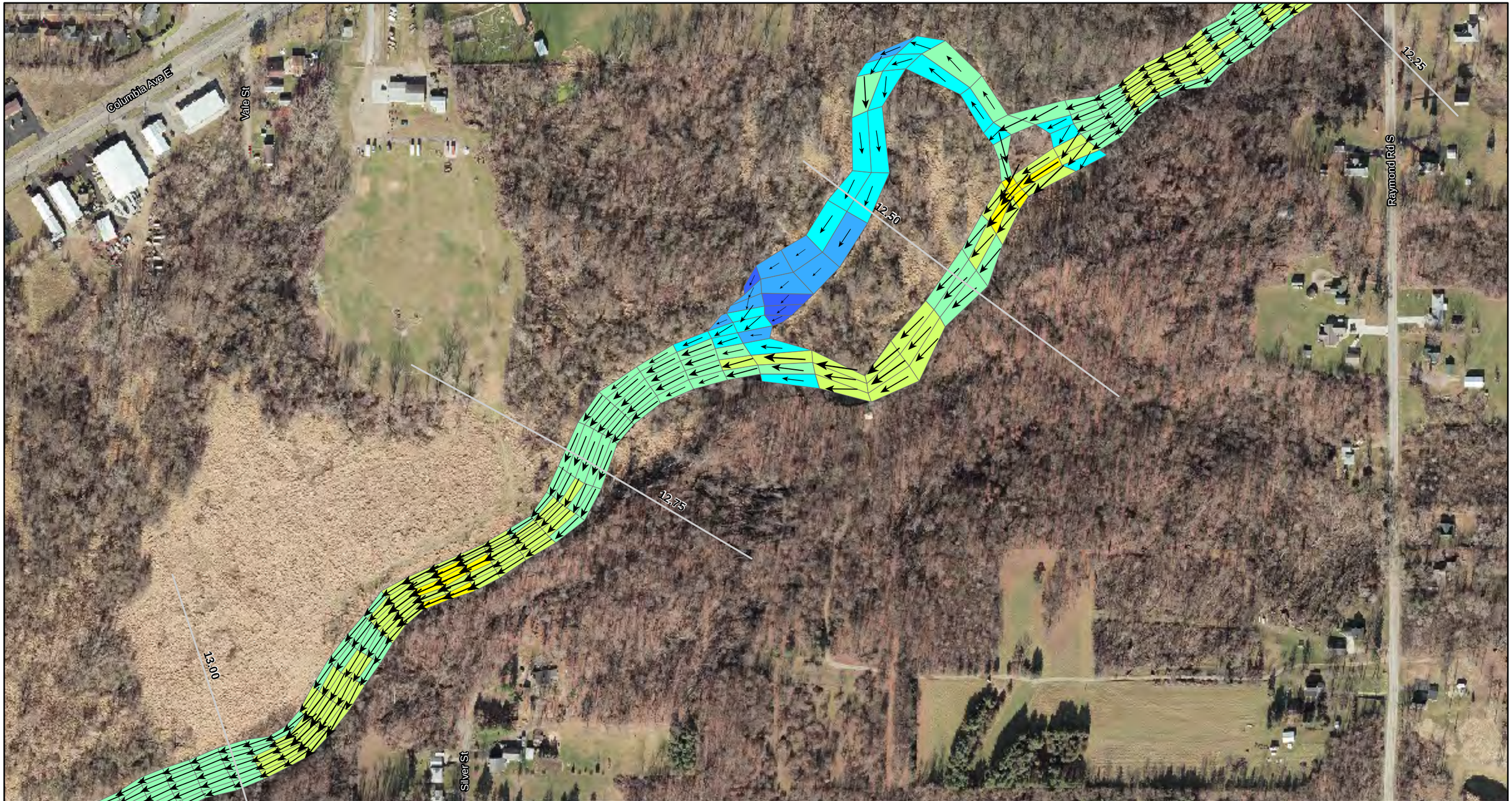
MP 11.10 - MP 12.45

SHEET 14 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

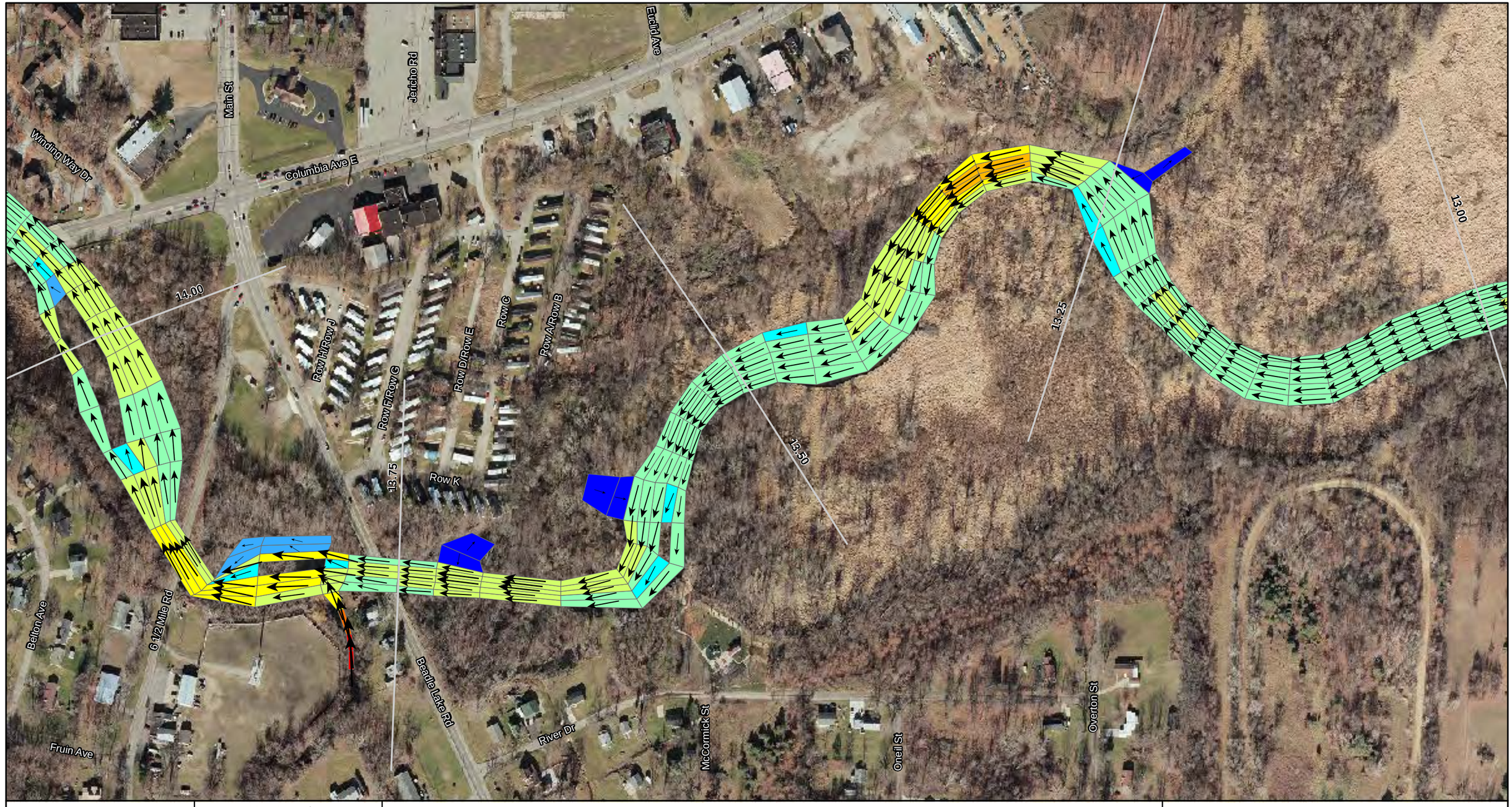
MP 12.30 - MP 13.05

SHEET 15 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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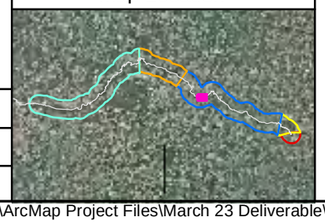
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

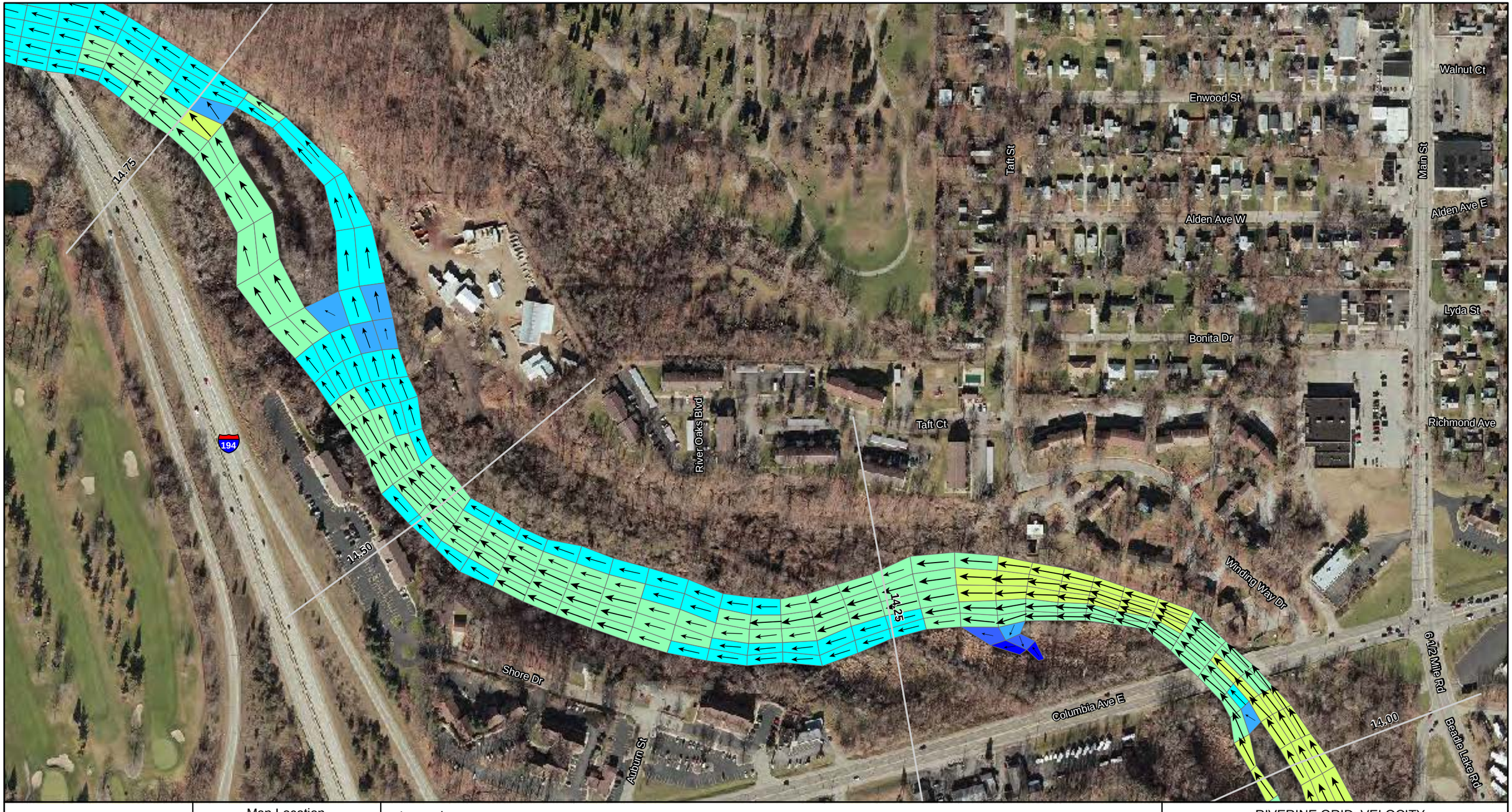
MP 13.00 - MP 14.10

SHEET 16 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May23_2011.mxd

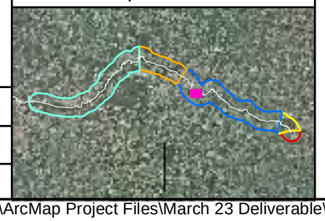
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

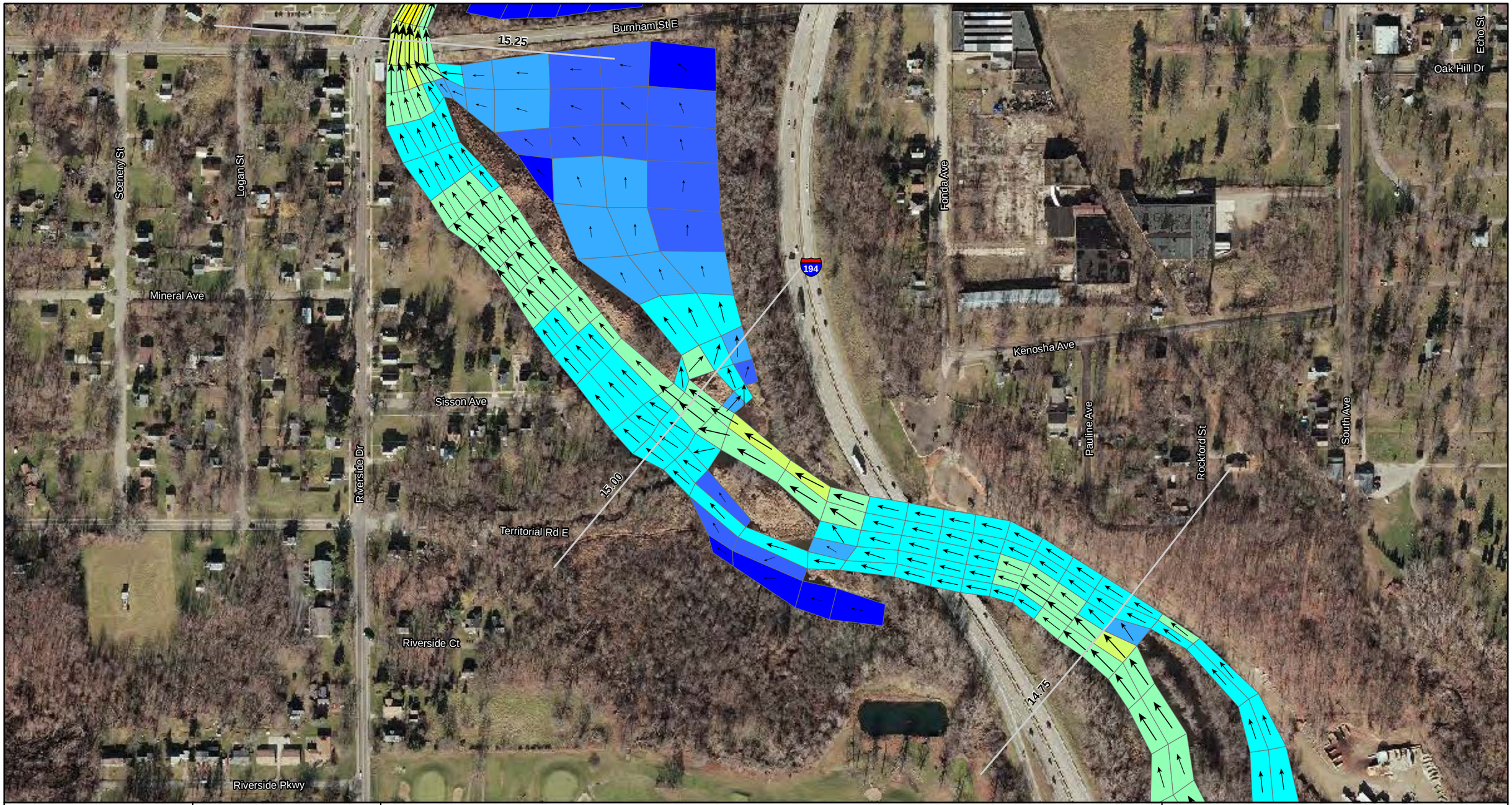
MP 14.00 - MP 14.85

SHEET 17 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

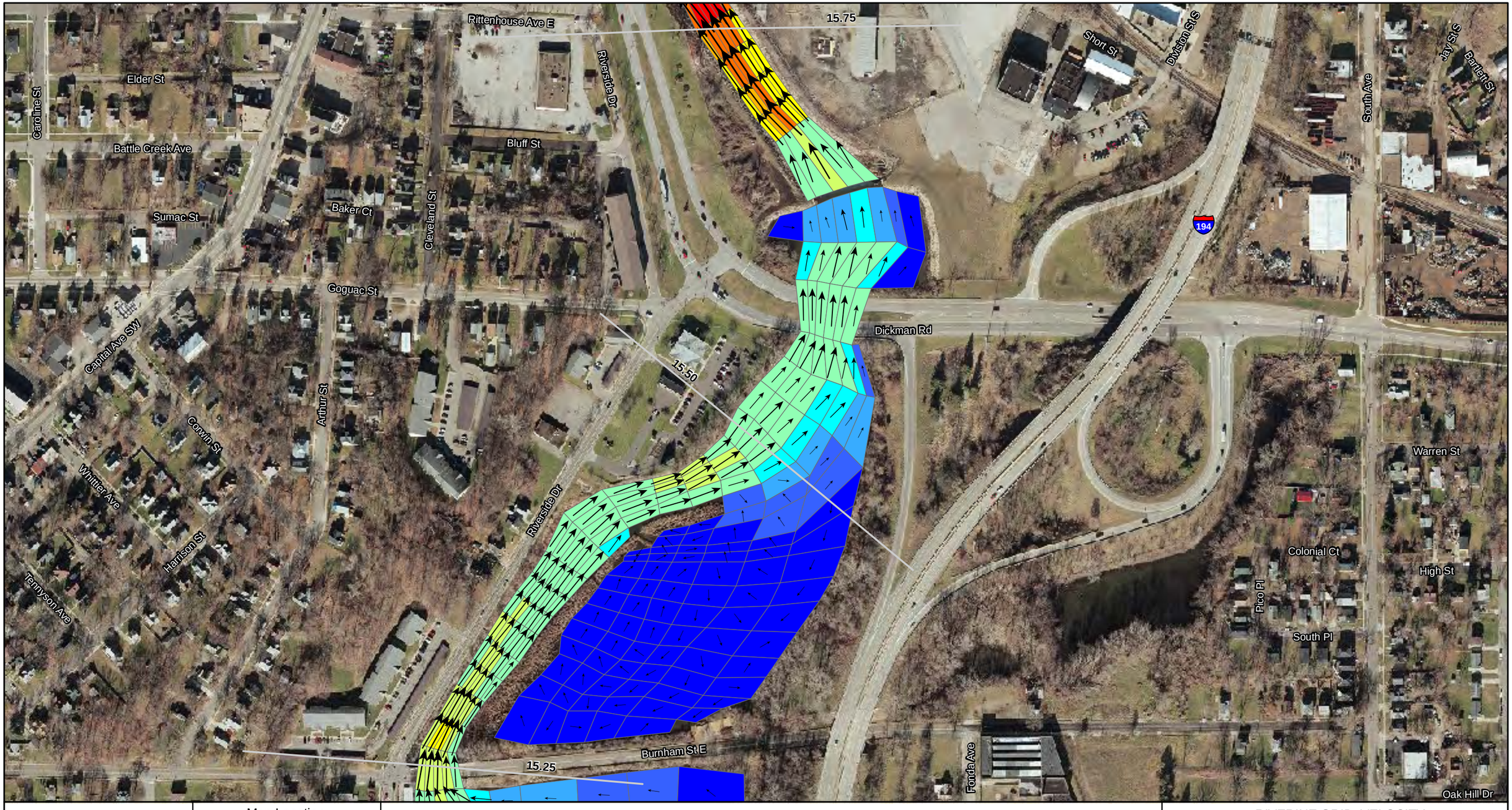
MP 14.65 - MP 15.25

SHEET 18 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May23_2011.mxd

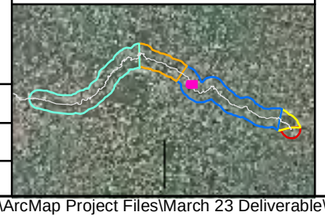
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

MP 15.25 - MP 15.75

SHEET 19 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May23_2011.mxd

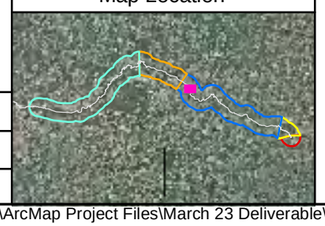
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

MP 15.75 - MP 16.30

SHEET 20 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

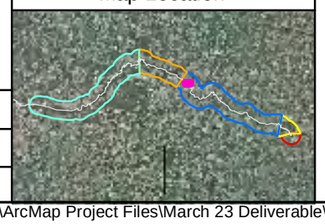
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May23_2011.mxd

Aerial Photography Date: November 2011

Cass St N
Michigan Ave W
Washington Ave N
Champion St
Brook St
Cass St S
Could St
Van Buren St W
Archer Ct
Jackson St W
Service St
Hamblin Ave W
16.75
Barney St
Washington Ave S
16.50
Lafayette St
Kendall St S
Putnam St
Page St
Louise St
Carlyle St
Houston St
Grand Trunk Ave
Dickman Rd
16.25

ENBRIDGE	
Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

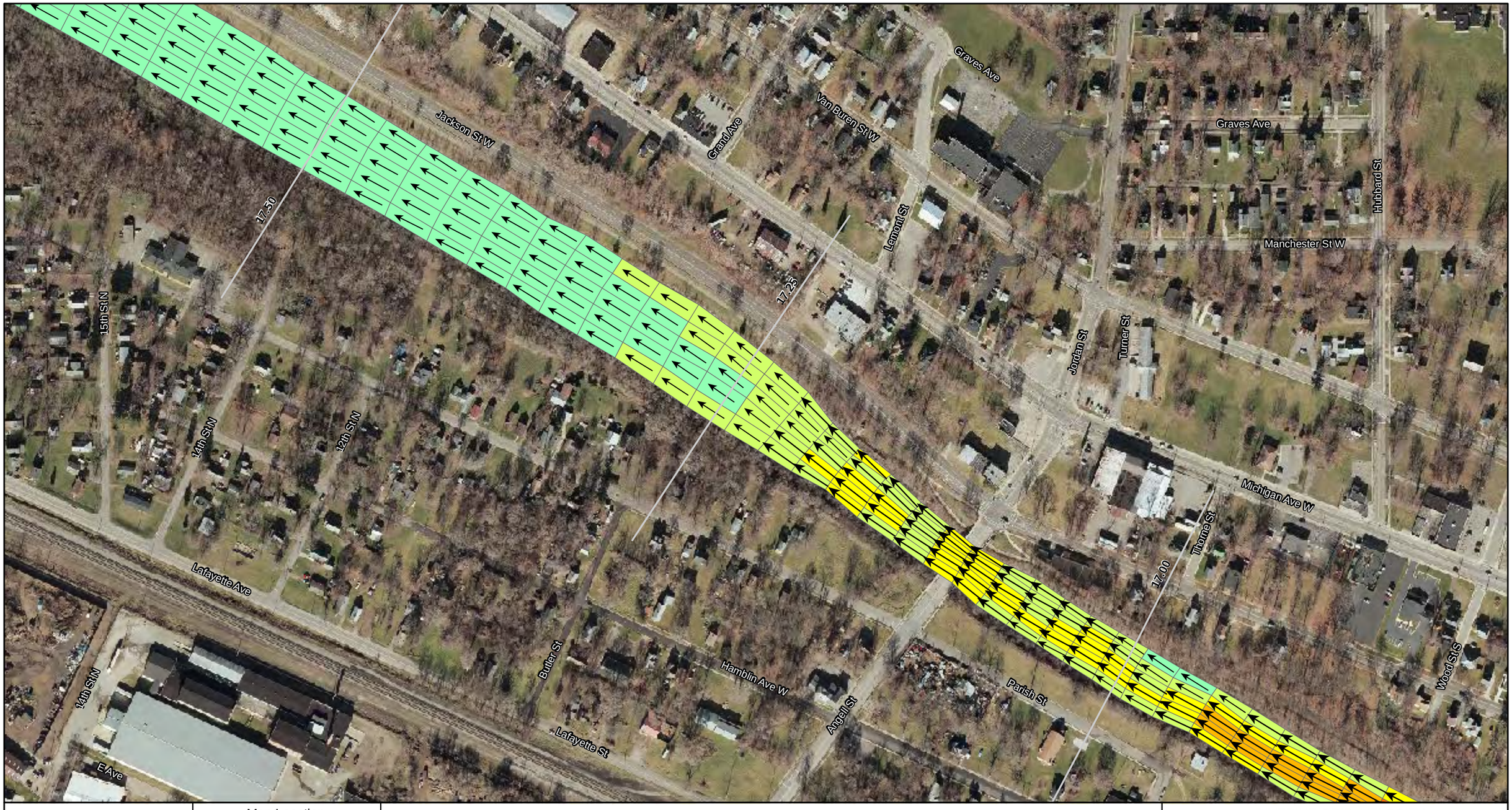
MP 16.30 - MP 16.95

SHEET 21 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May23_2011.mxd

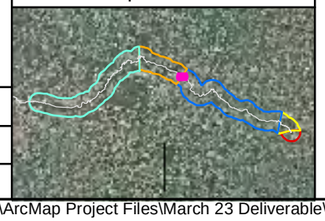
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

MP 16.85 - MP 17.60

SHEET 22 OF 56

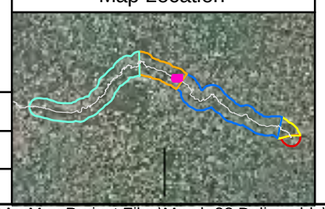
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May23_2011.mxd

Aerial Photography Date: November 2011



Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500
Scale in Feet

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

RIVERINE GRID: VELOCITY
MAY 23, 2011

MP 17.60 - MP 18.40

SHEET 23 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May23_2011.mxd

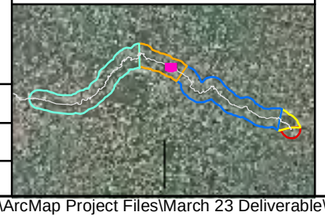
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

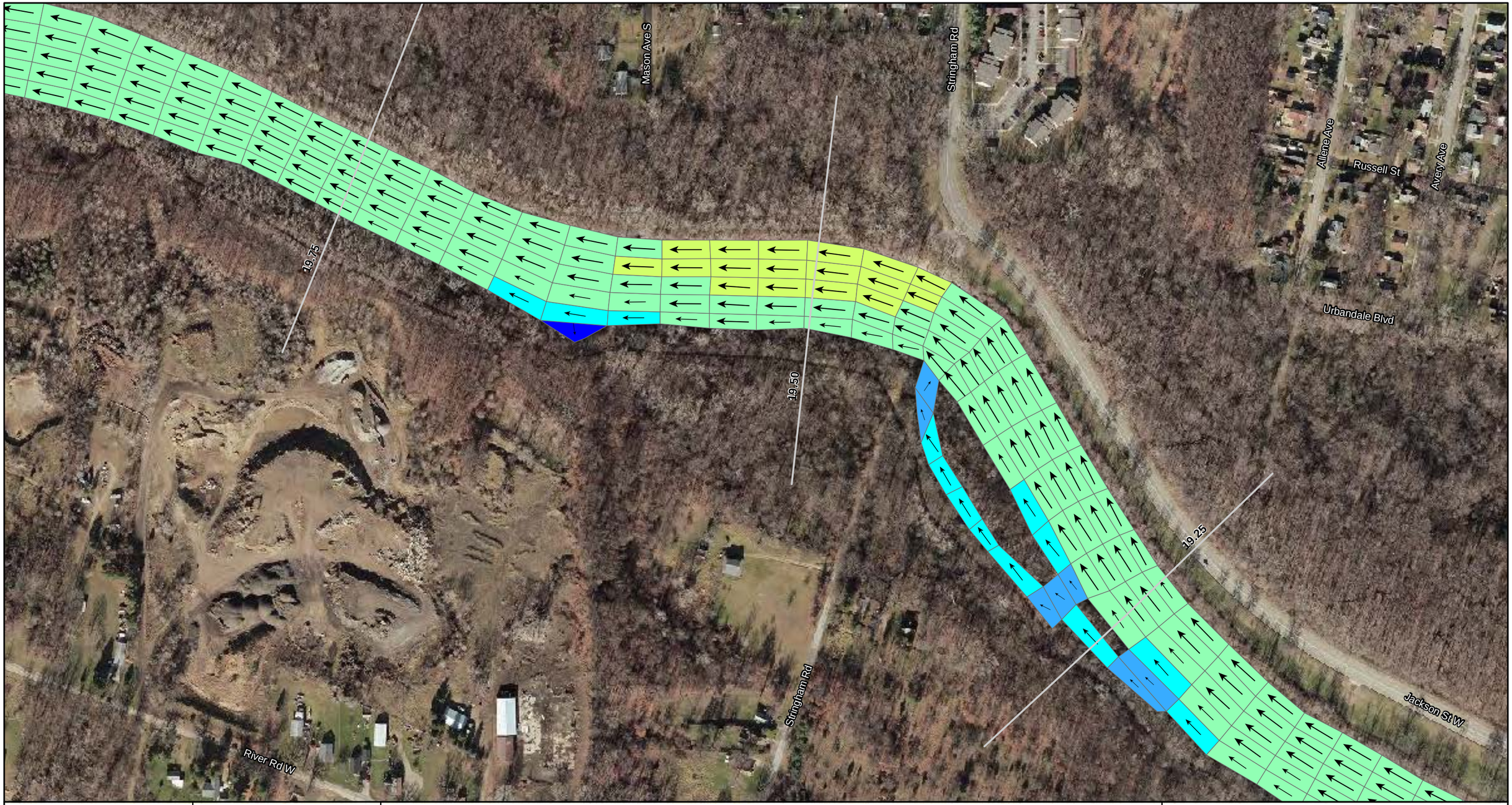
MP 18.30 - MP 19.15

SHEET 24 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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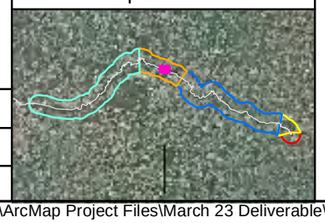
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

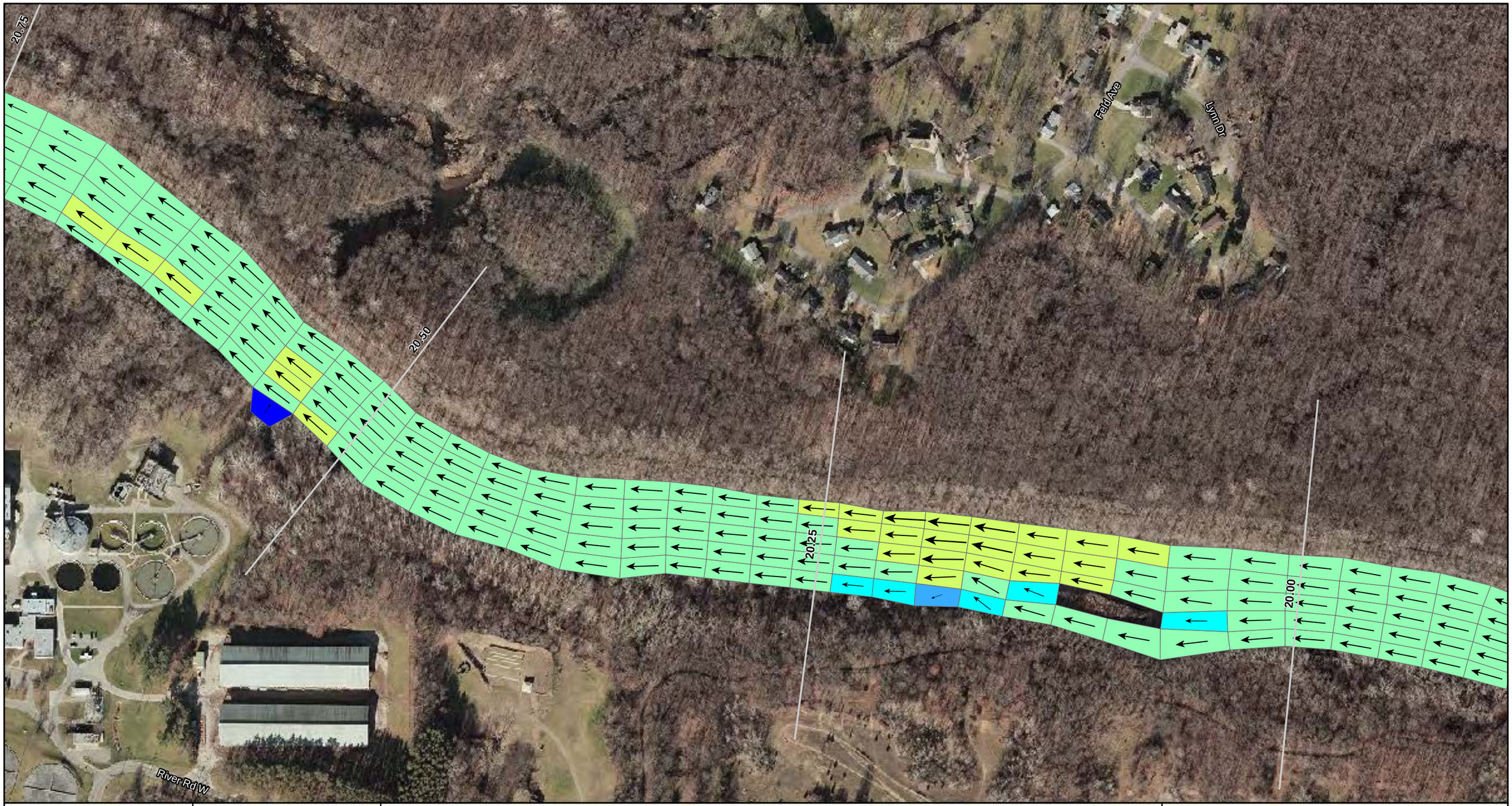
MP 19.10 - MP 19.95

SHEET 25 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May23_2011.mxd

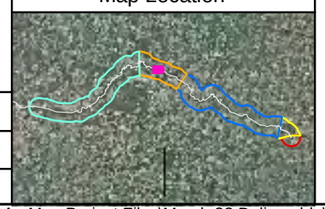
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

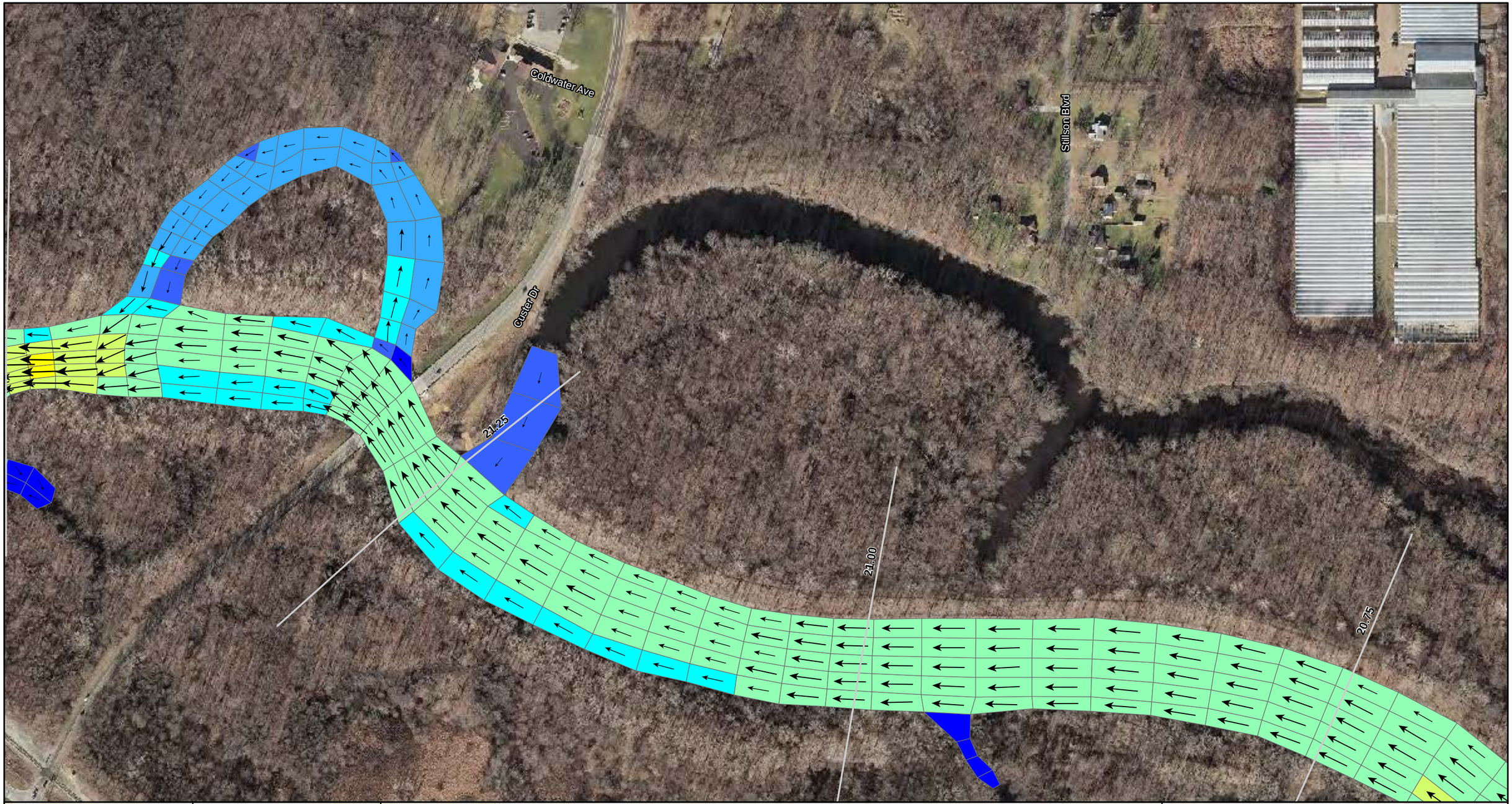
MP 19.90 - MP 20.75

SHEET 26 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

MP 20.70 - MP 21.50

SHEET 27 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

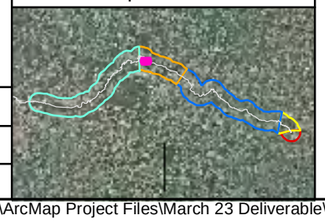
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May23_2011.mxd

Aerial Photography Date: November 2011



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

MP 21.35 - MP 22.15

SHEET 28 OF 56

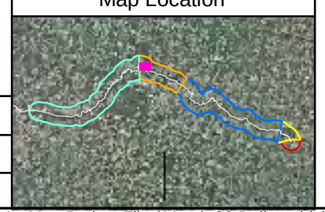
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May23_2011.mxd

Aerial Photography Date: November 2011



Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

RIVERINE GRID: VELOCITY
MAY 23, 2011

MP 22.15 - MP 22.90

SHEET 29 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May23_2011.mxd

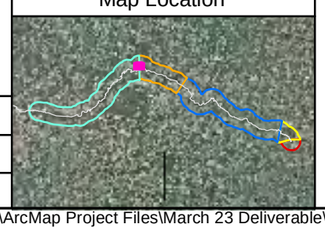
Aerial Photography Date: November 2011

San Juan Ave
Colorado St
Charleston Ave
Kalamazoo Ave
23.25
23.50
23.00
23.75
24.00

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

MP 22.80 - MP 24.10

SHEET 30 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

24.00
24.25
24.50
24.75
River Rd W
Fort Custer Dr
County Line Rd

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

MP 24.10 - MP 24.85

SHEET 31 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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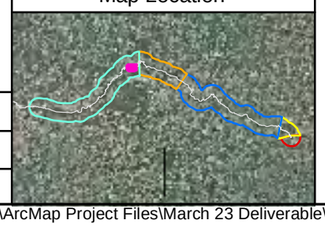
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

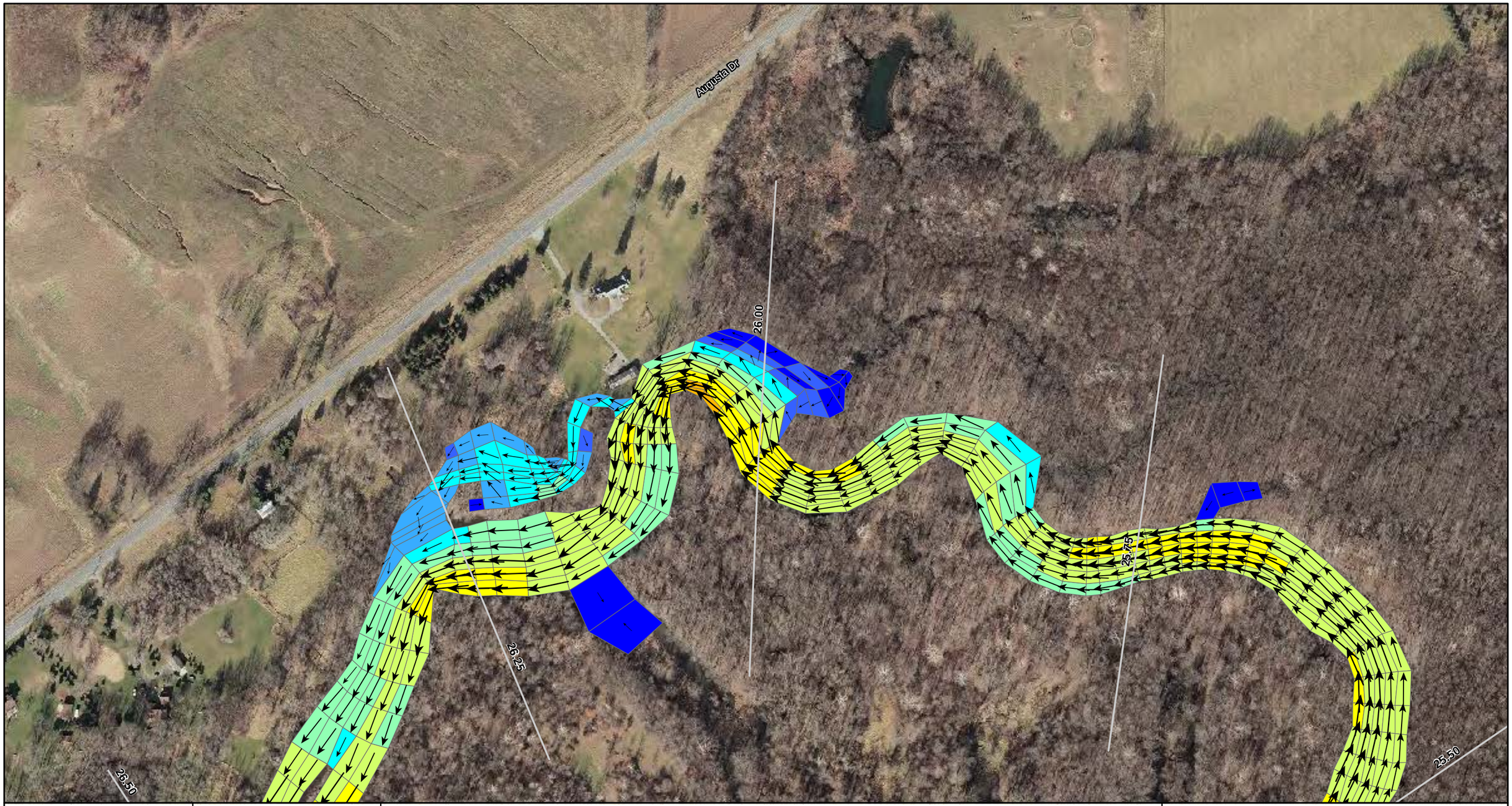
MP 24.80 - MP 25.65

SHEET 32 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

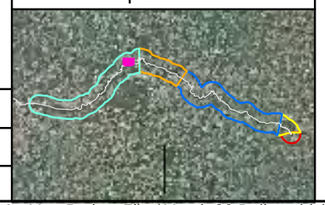
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Aerial Photography Date: November 2011



Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

MP 25.55 - MP 26.40

SHEET 33 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

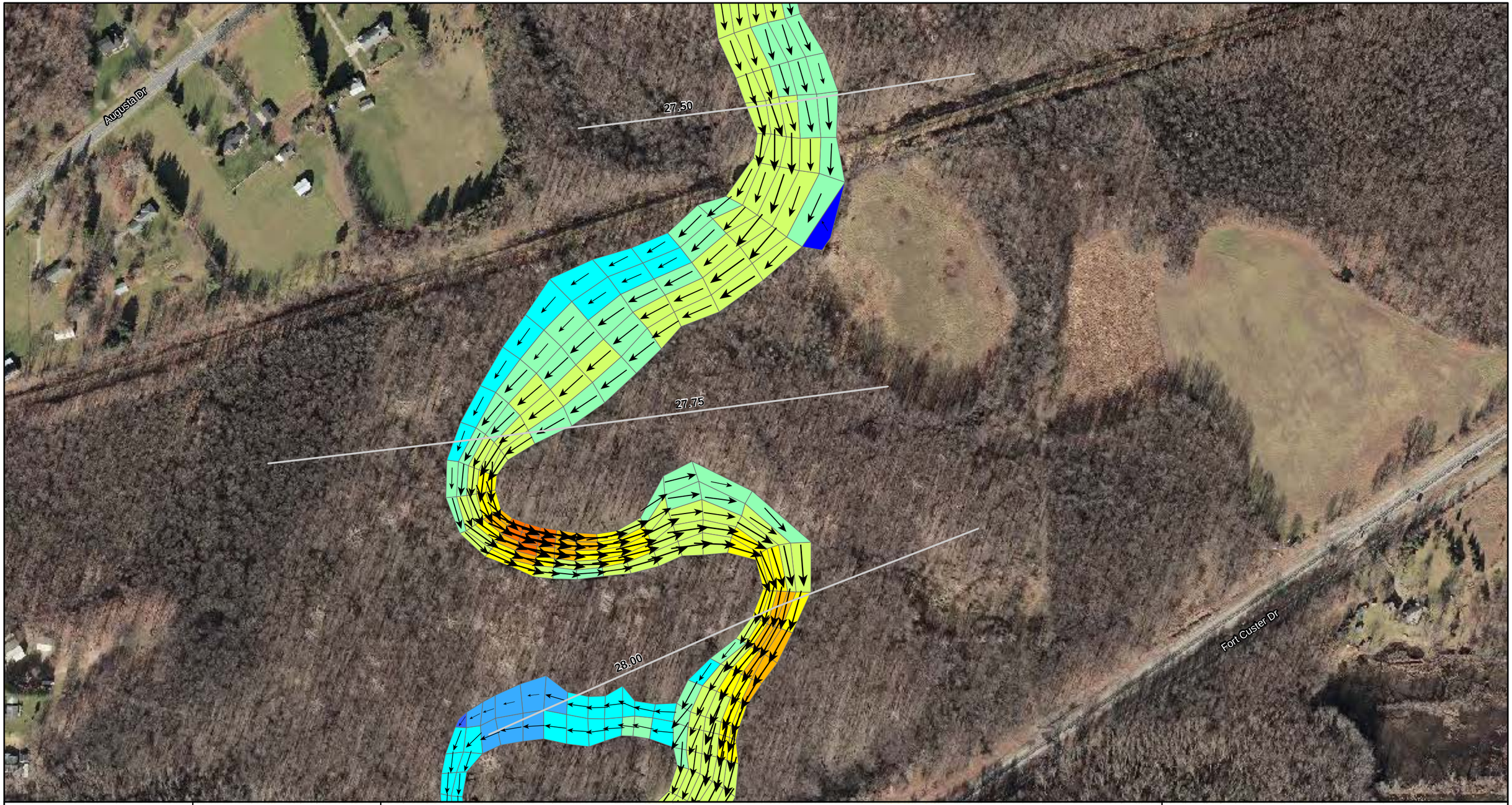
MP 26.40 - MP 27.45

SHEET 34 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May23_2011.mxd

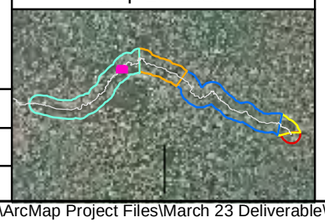
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

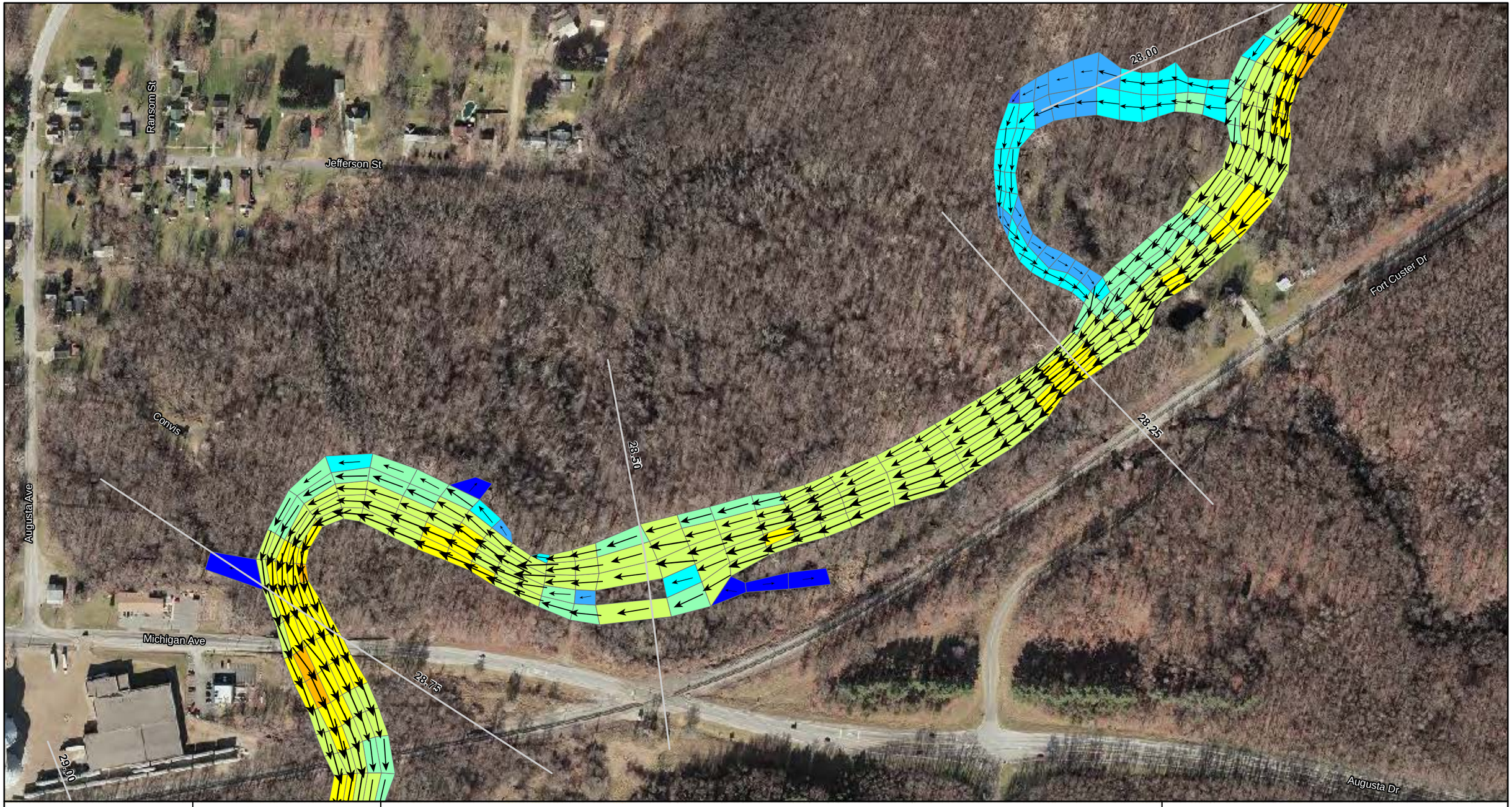
MP 27.45 - MP 28.10

SHEET 35 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May23_2011.mxd

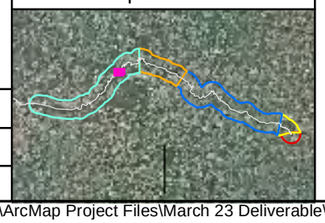
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

⟵ Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

MP 28.05 - MP 28.85

SHEET 36 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

MP 28.85 - MP29.55

SHEET 37 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

29.50
29.75
30.00
30.25
Fort Custer Rec Area Service
Fort Custer Rec Area Access

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

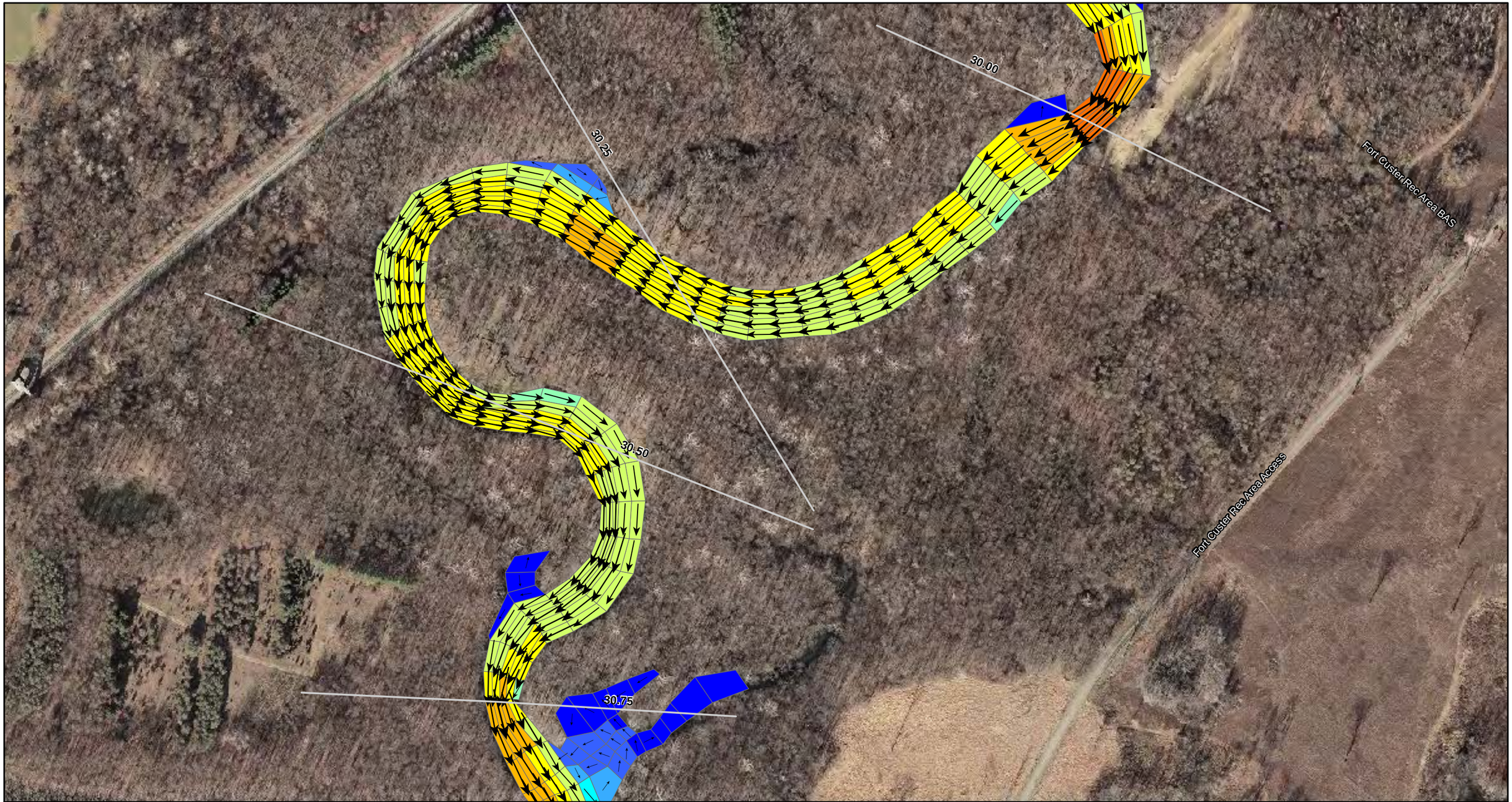
MP 29.50 - MP29.95

SHEET 38 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

MP 29.95 - MP 30.80

SHEET 39 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

MP 30.75 - MP 31.25

SHEET 40 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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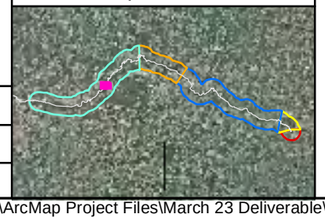
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

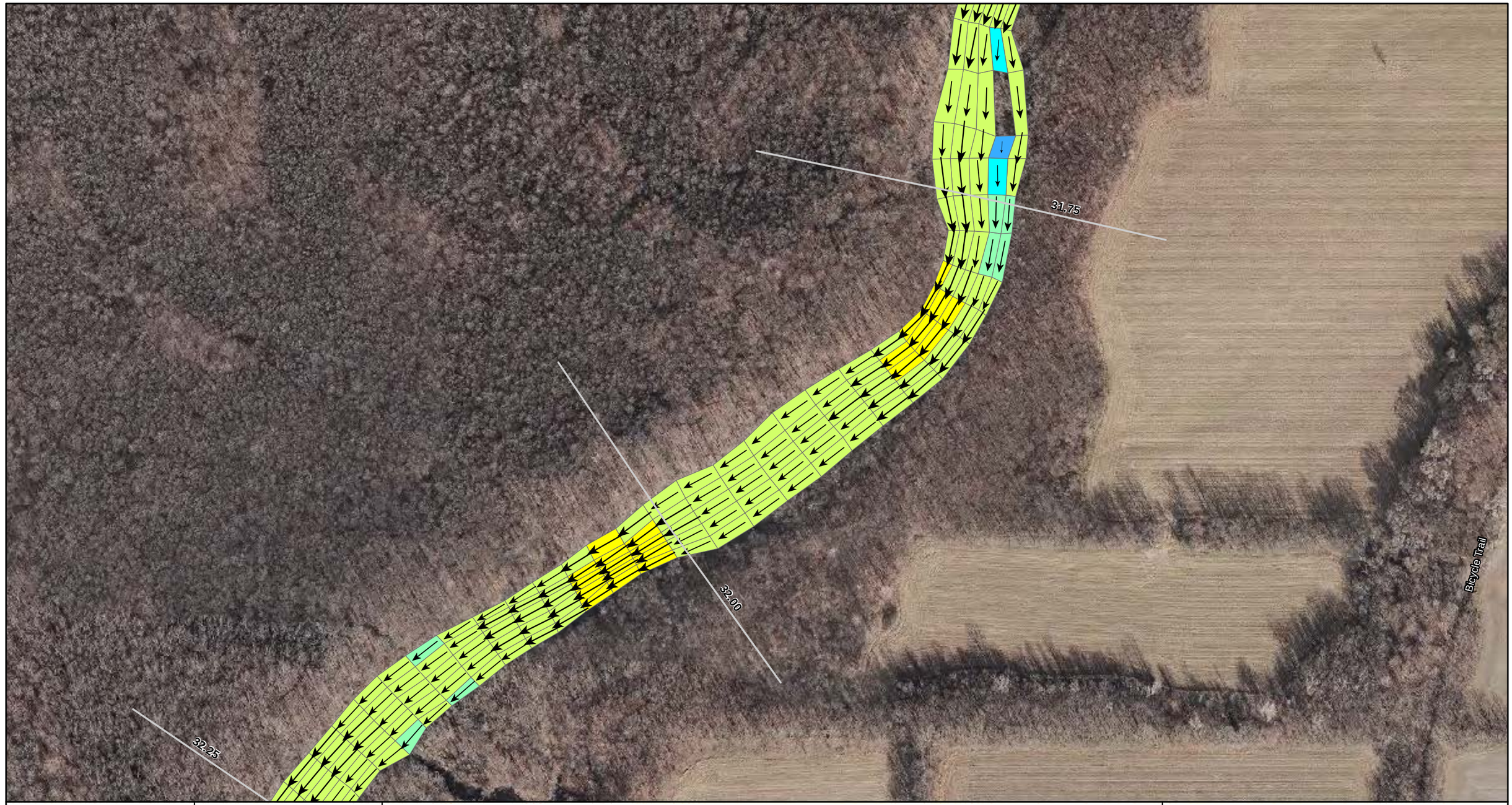
MP 31.25 - MP 31.70

SHEET 41 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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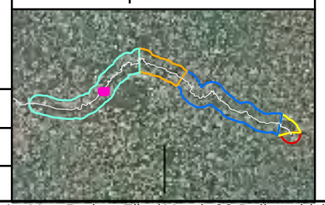
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

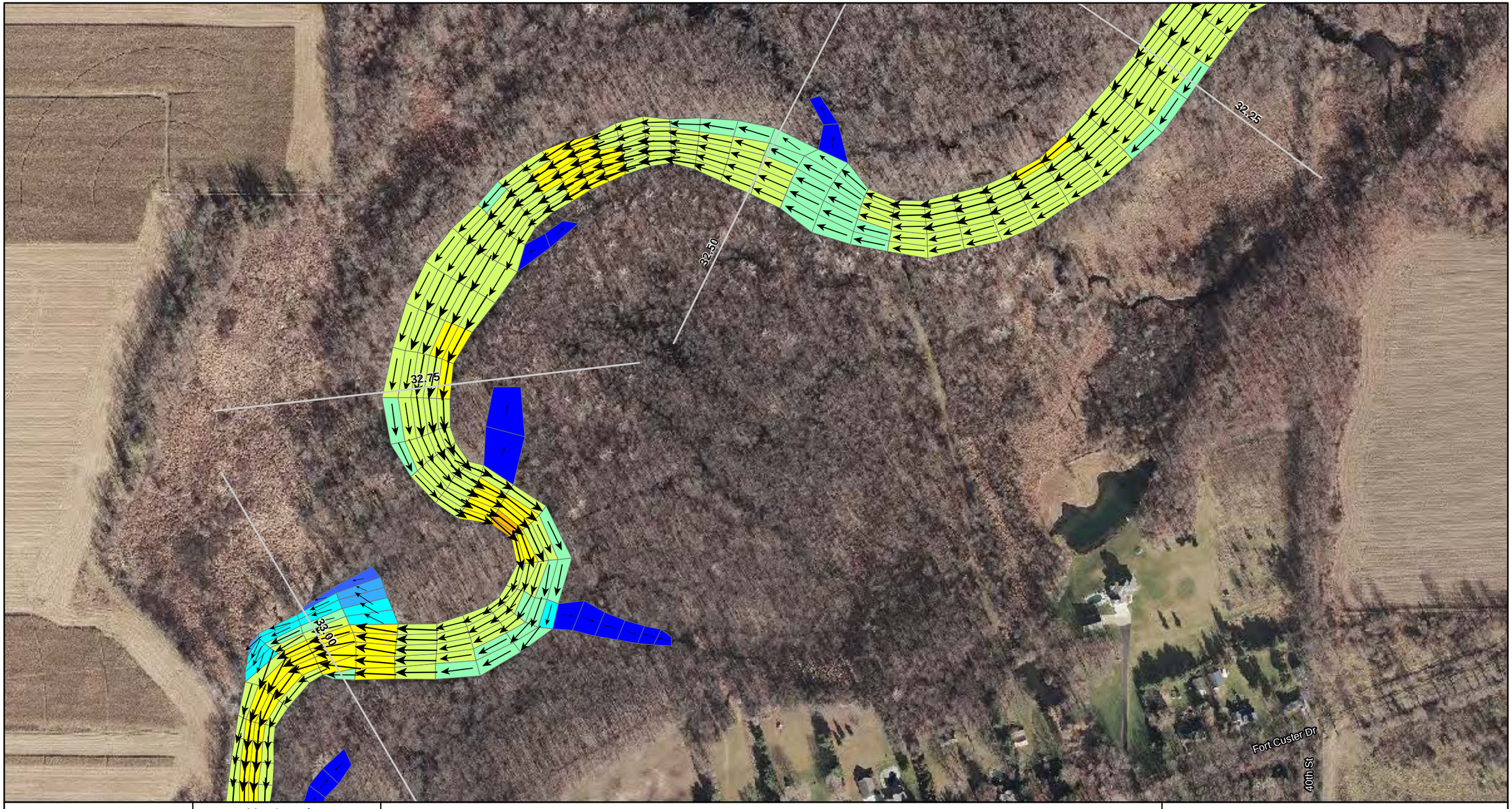
MP 31.65 - MP 32.25

SHEET 42 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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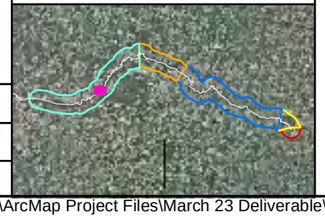
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

MP 32.25 - MP 33.10

SHEET 43 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

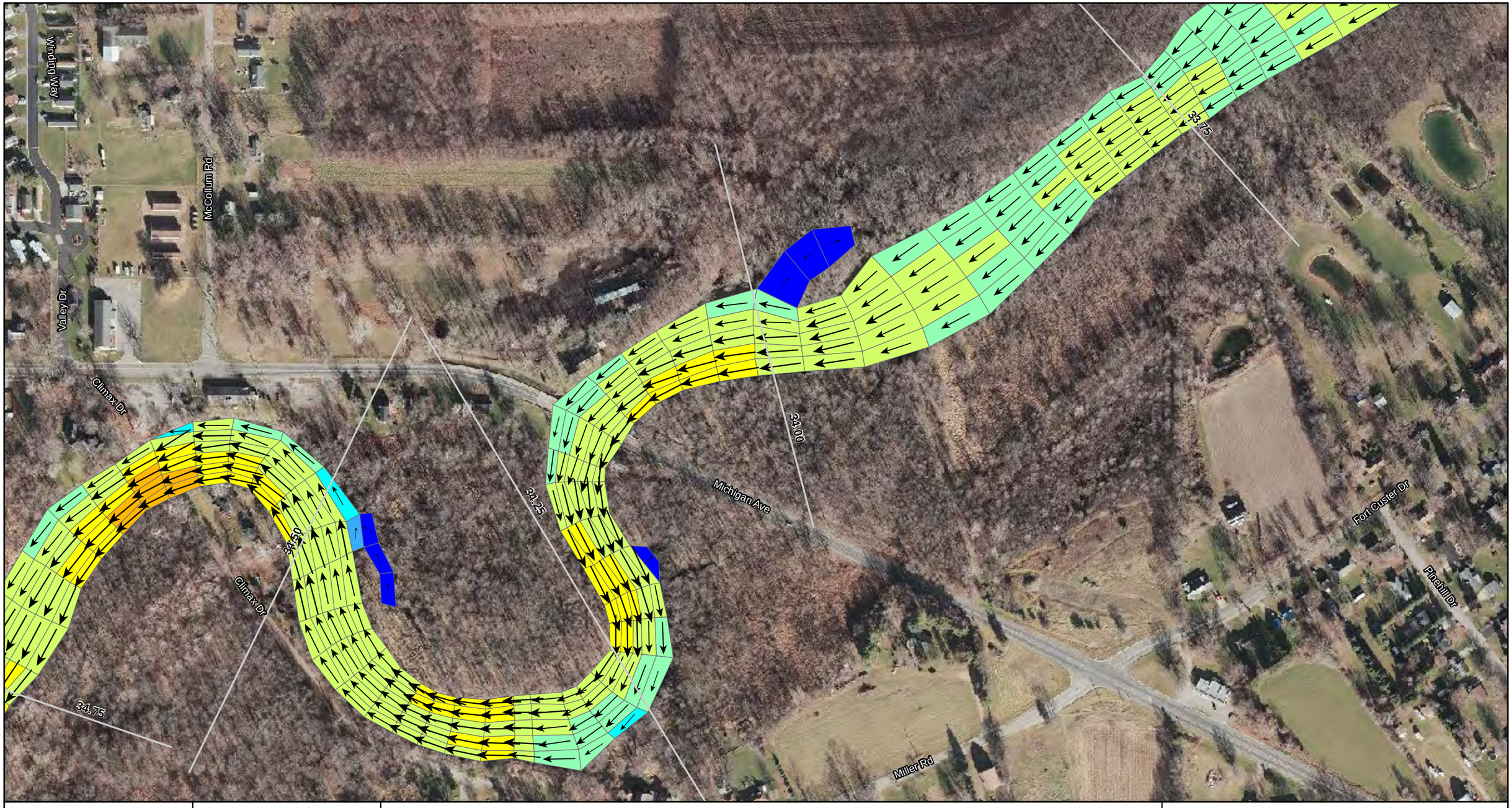
MP 33.10 - MP 33.70

SHEET 44 OF 56

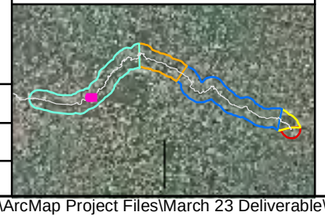
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May23_2011.mxd

Aerial Photography Date: November 2011



Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

RIVERINE GRID: VELOCITY
MAY 23, 2011

MP 33.70 - MP 34.70

SHEET 45 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

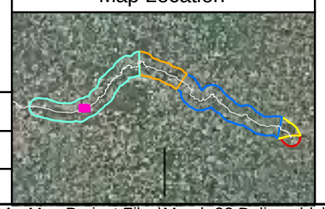
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Aerial Photography Date: November 2011



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

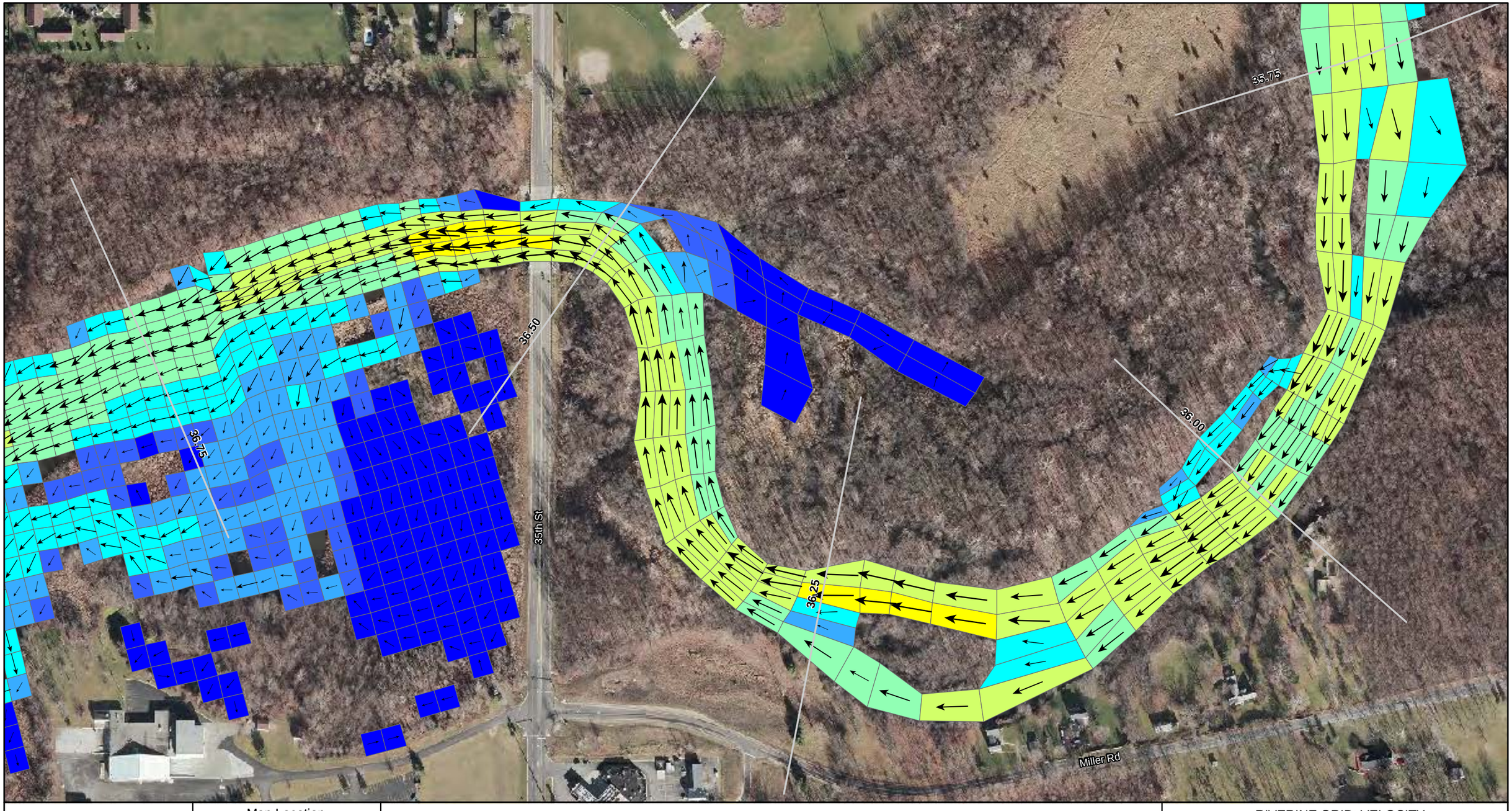
MP 34.70 - MP 35.75

SHEET 46 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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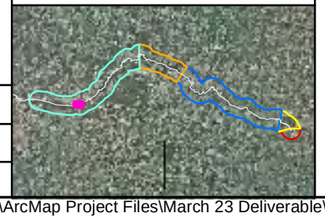
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

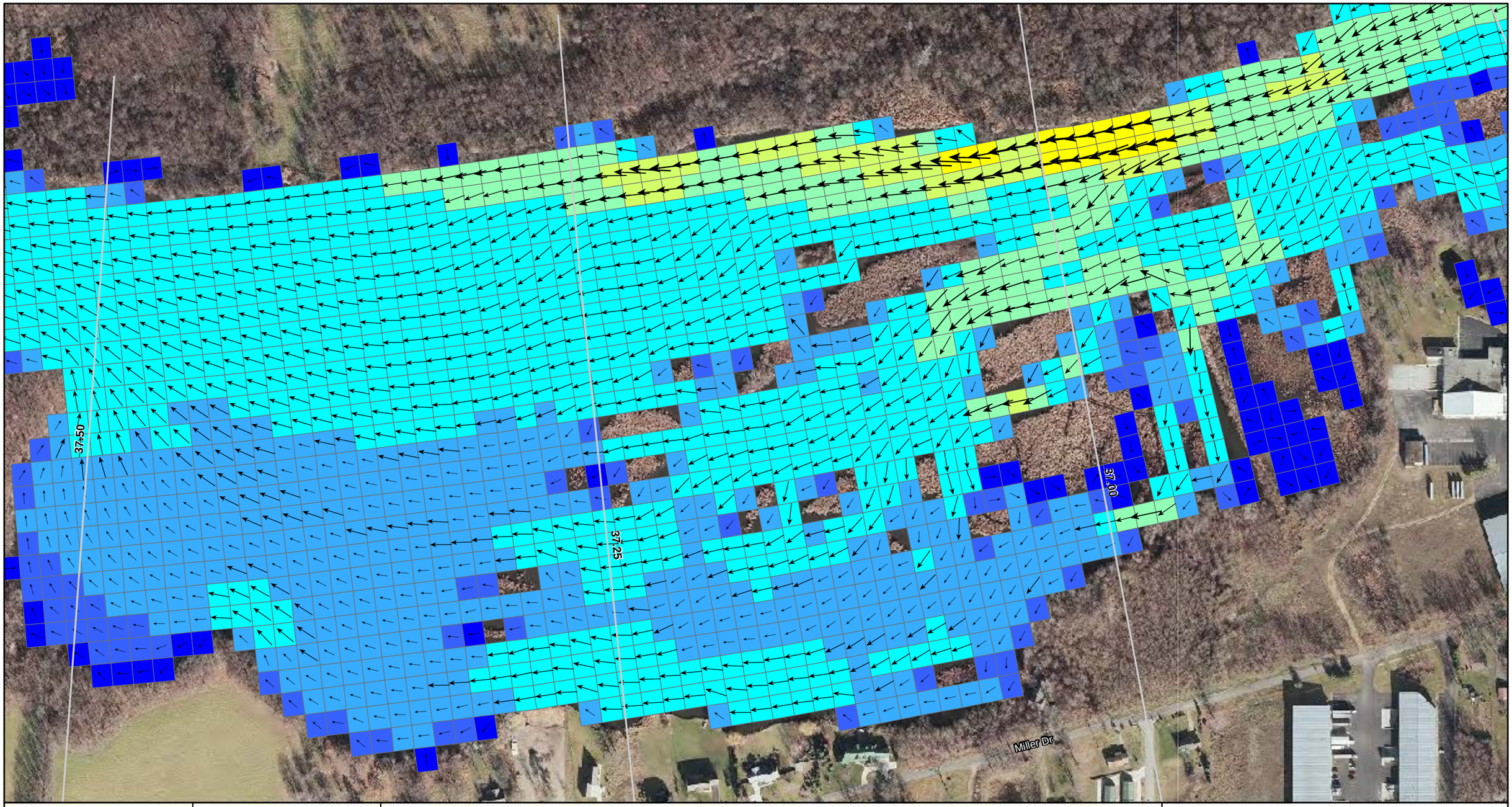
MP 35.75 - MP 36.80

SHEET 47 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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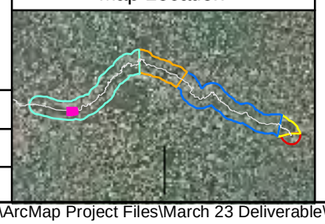
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

MP 36.80 - MP 37.55

SHEET 48 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

38.25

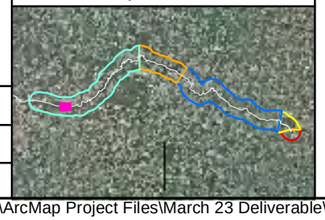
38.00

37.75

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

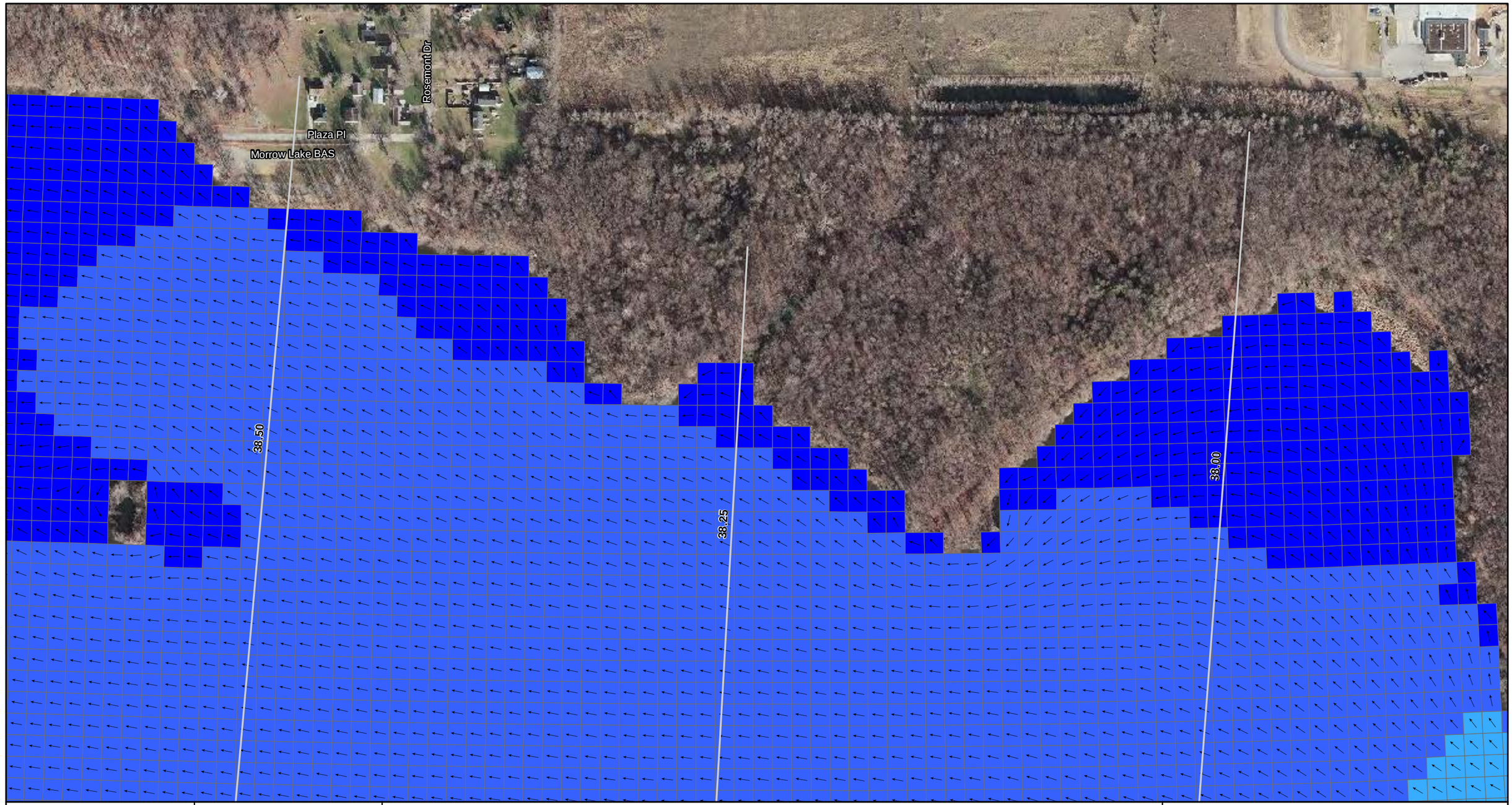
MP 37.55 - MP 38.30

SHEET 49 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May23_2011.mxd

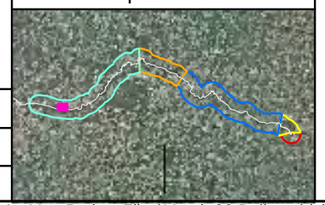
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

MP 37.80 - MP 38.60N

SHEET 50 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May23_2011.mxd

Aerial Photography Date: November 2011

38.50

38.25

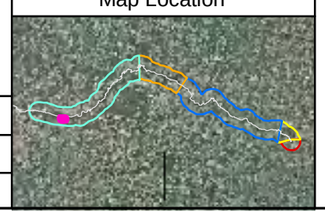
38.00

Lyth Rd

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

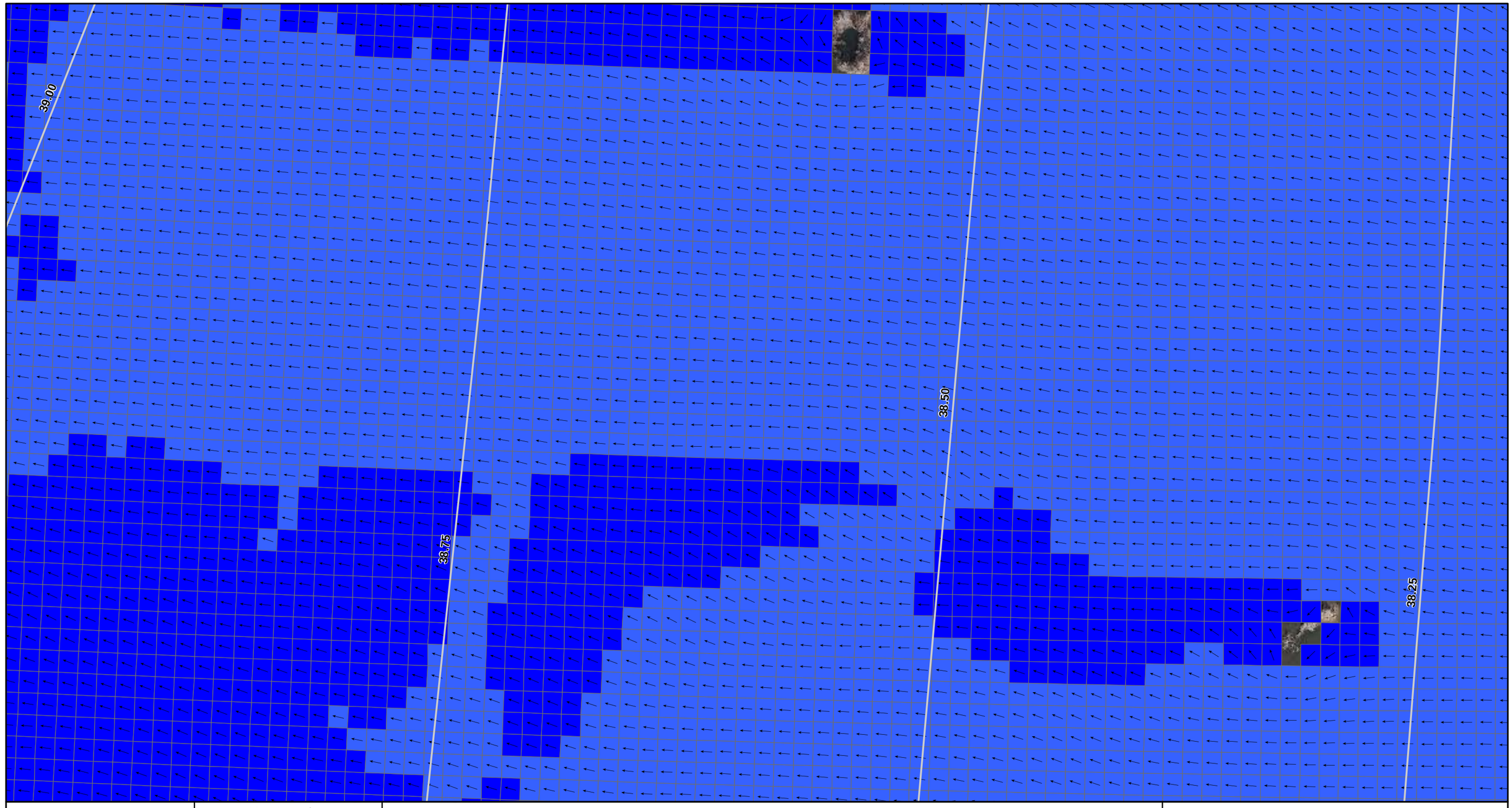
MP 37.80 - MP 38.60S

SHEET 51 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May23_2011.mxd

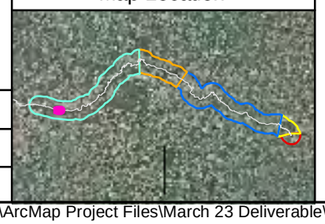
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

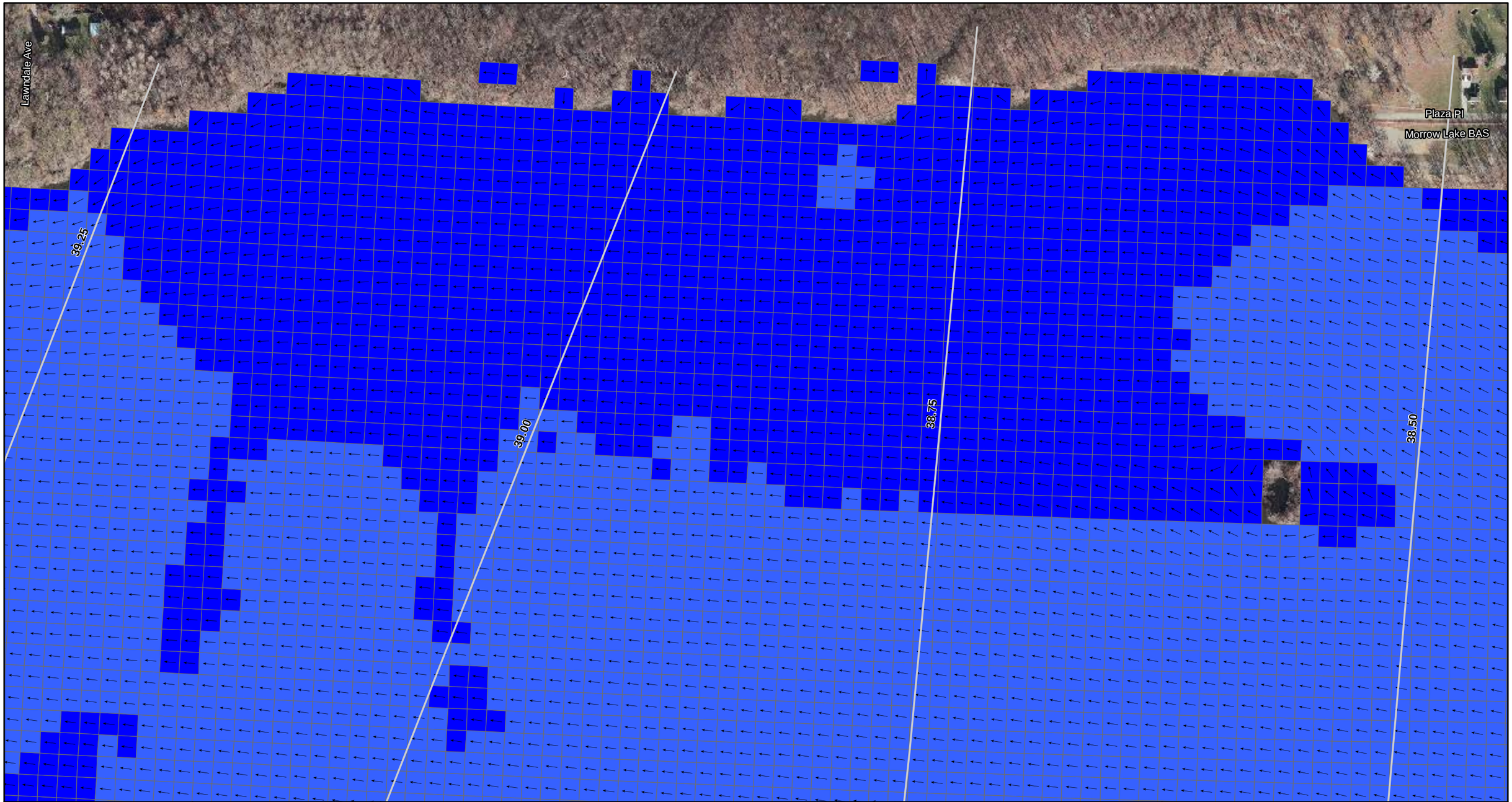
MP 38.25 - MP 39.00C

SHEET 52 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May23_2011.mxd

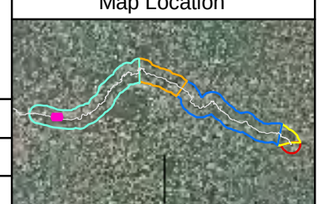
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

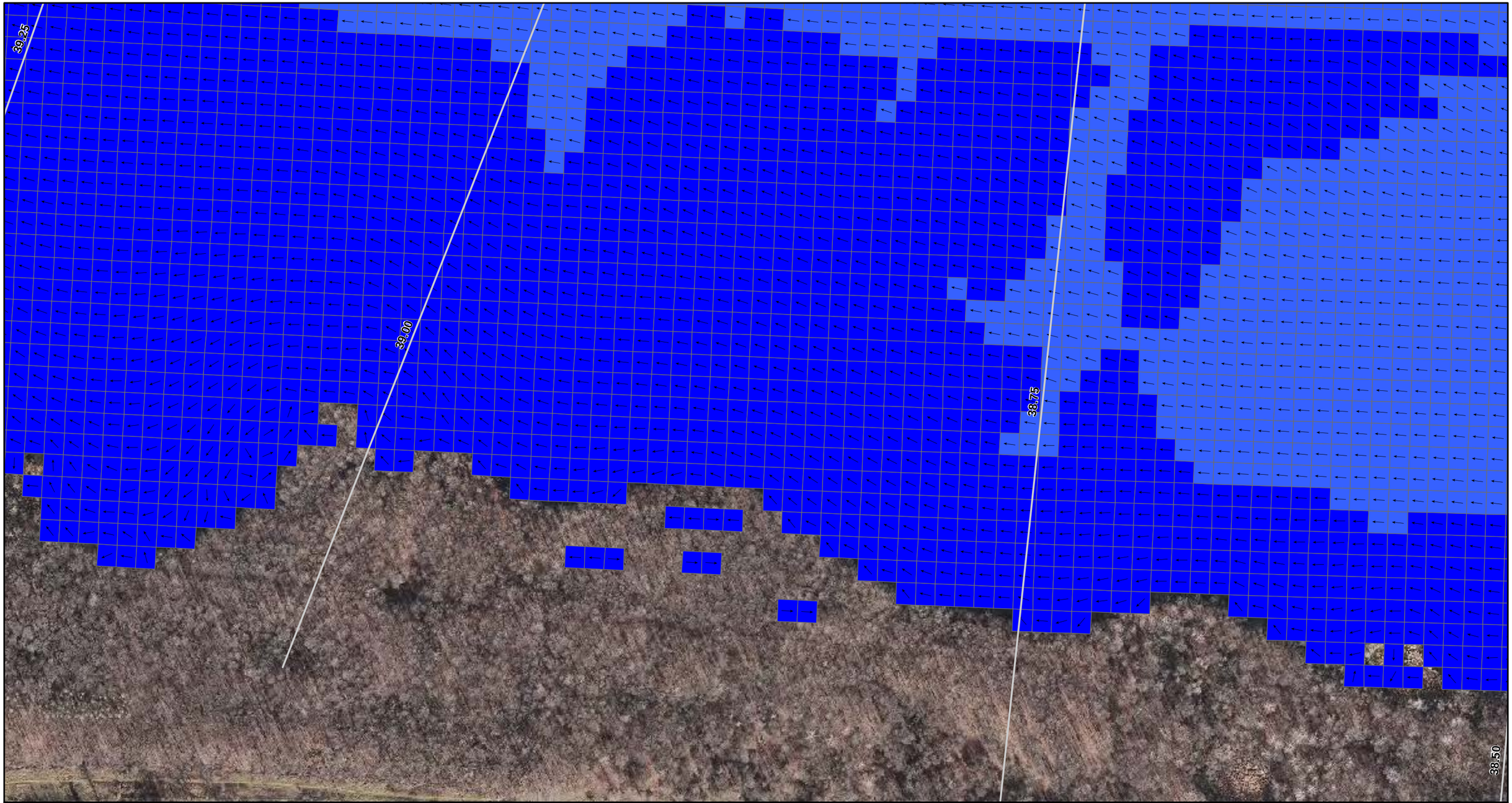
MP 38.50 - MP 39.25N

SHEET 53 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May23_2011.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

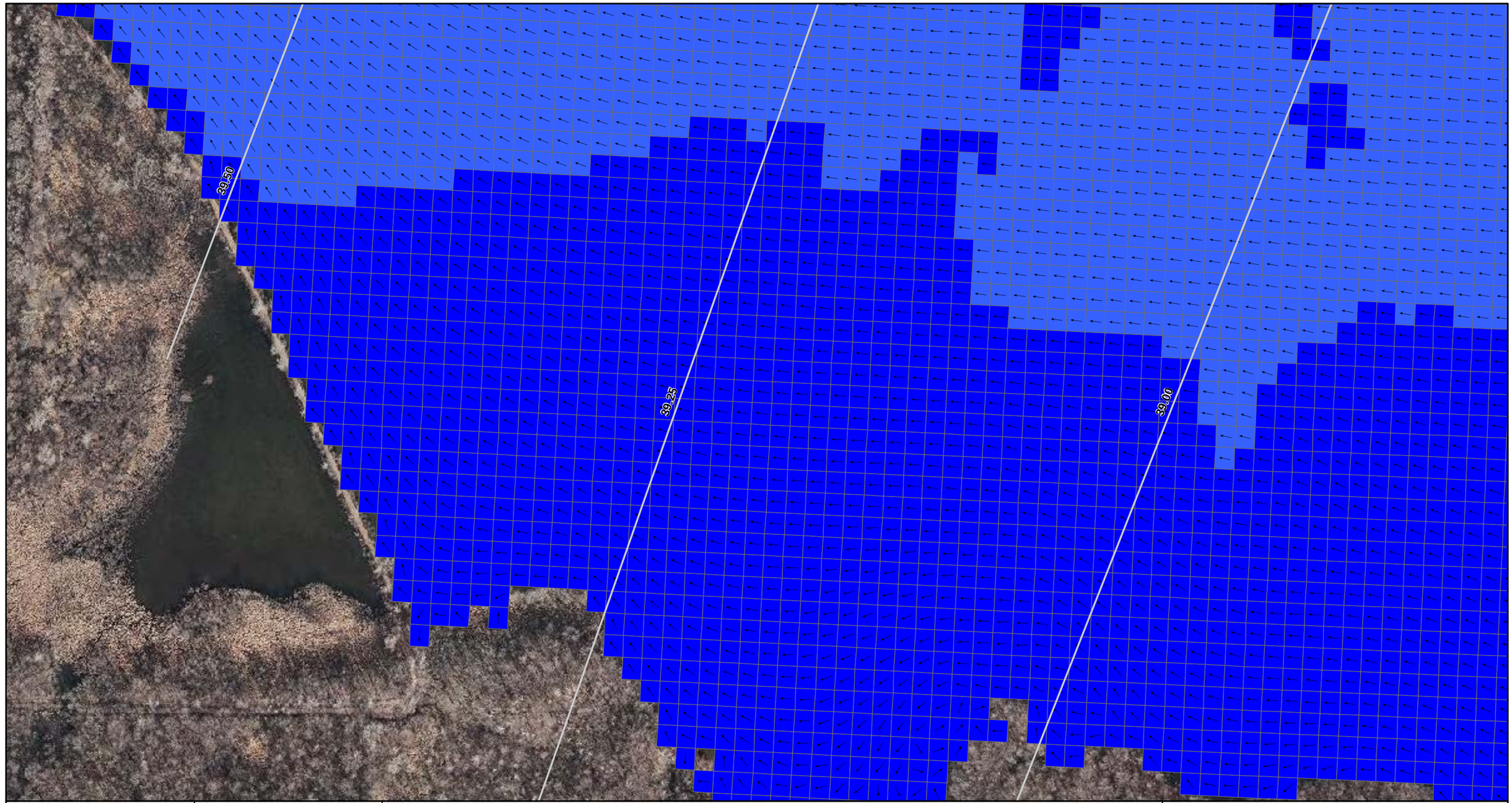
MP 38.50 - MP 39.25S

SHEET 54 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May23_2011.mxd

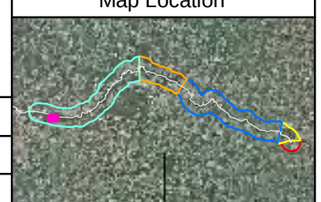
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

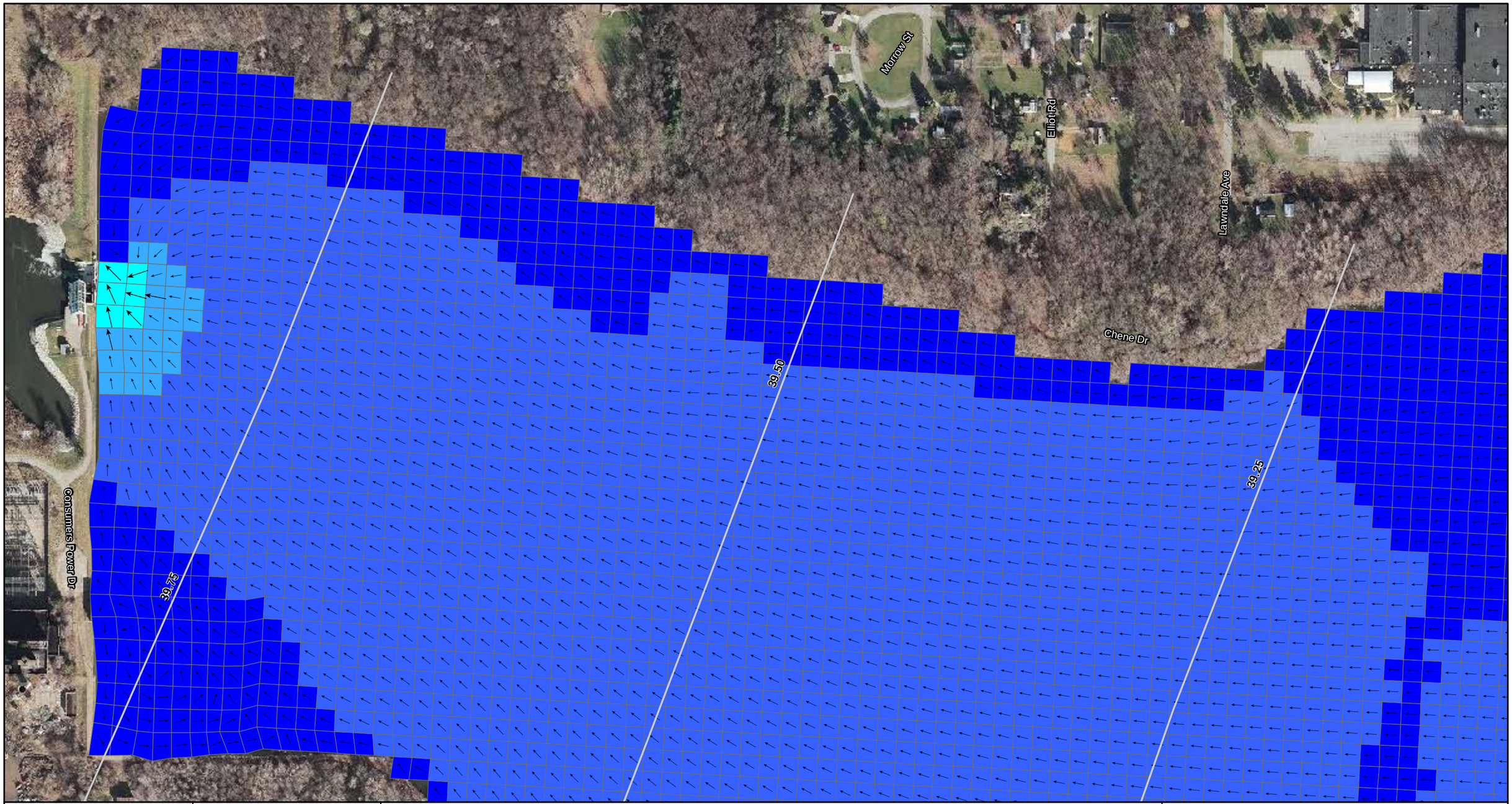
MP 38.90 - MP 39.60S

SHEET 55 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May23_2011.mxd

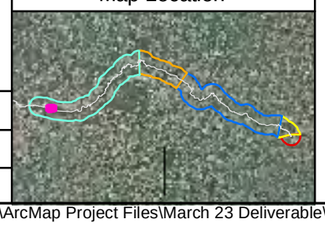
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - May 23, 2011

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
MAY 23, 2011

MP 39.15 - MP 39.85

SHEET 56 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_May23_2011.mxd

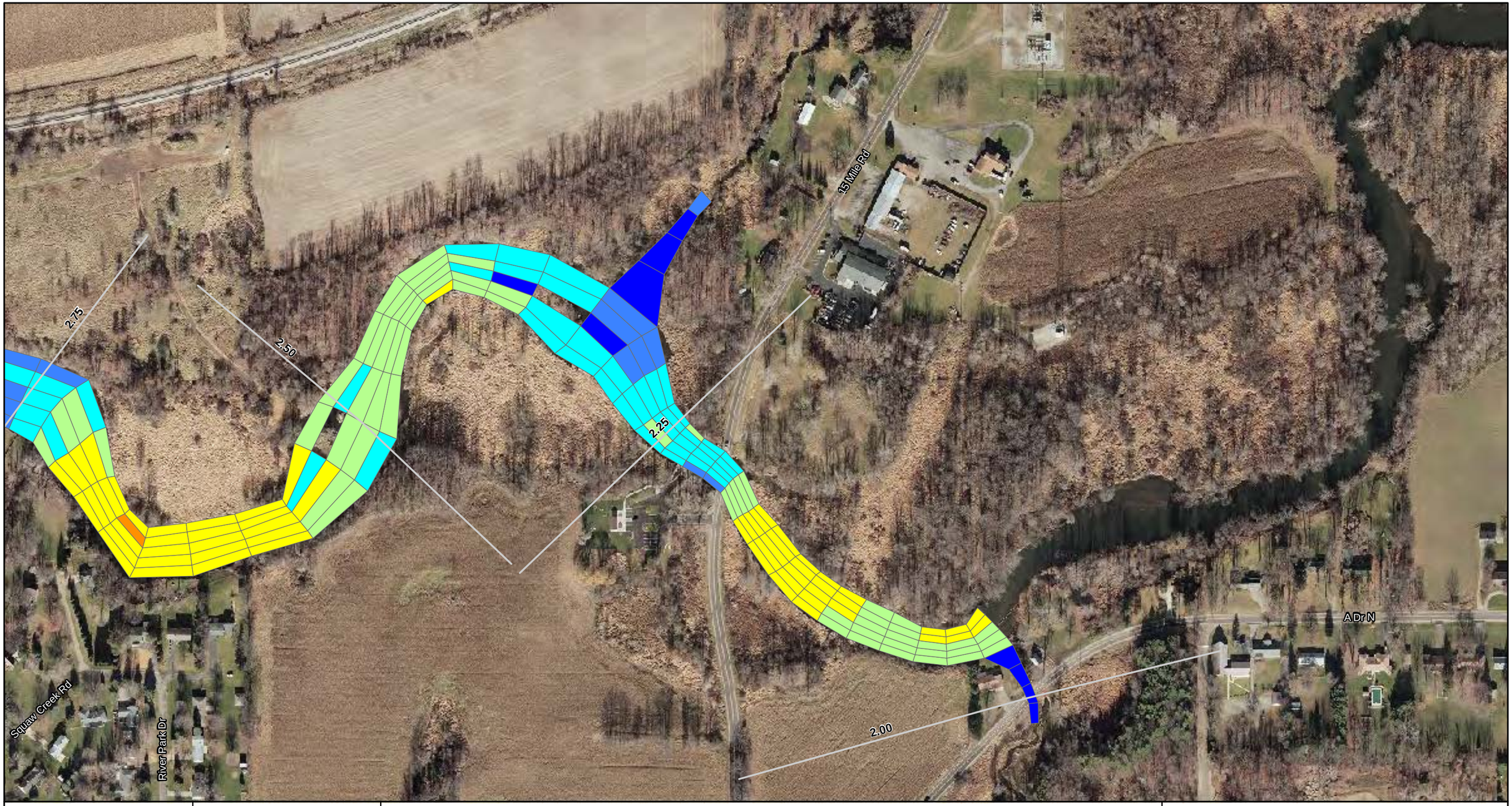
Aerial Photography Date: November 2011

Figure 5-10

Riverine Grid: Bed Shear Stress

May 20, 2011

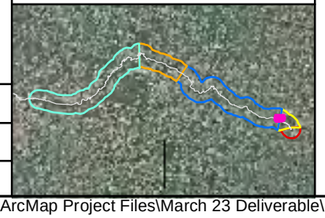
Sheets 1 through 56



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals

cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

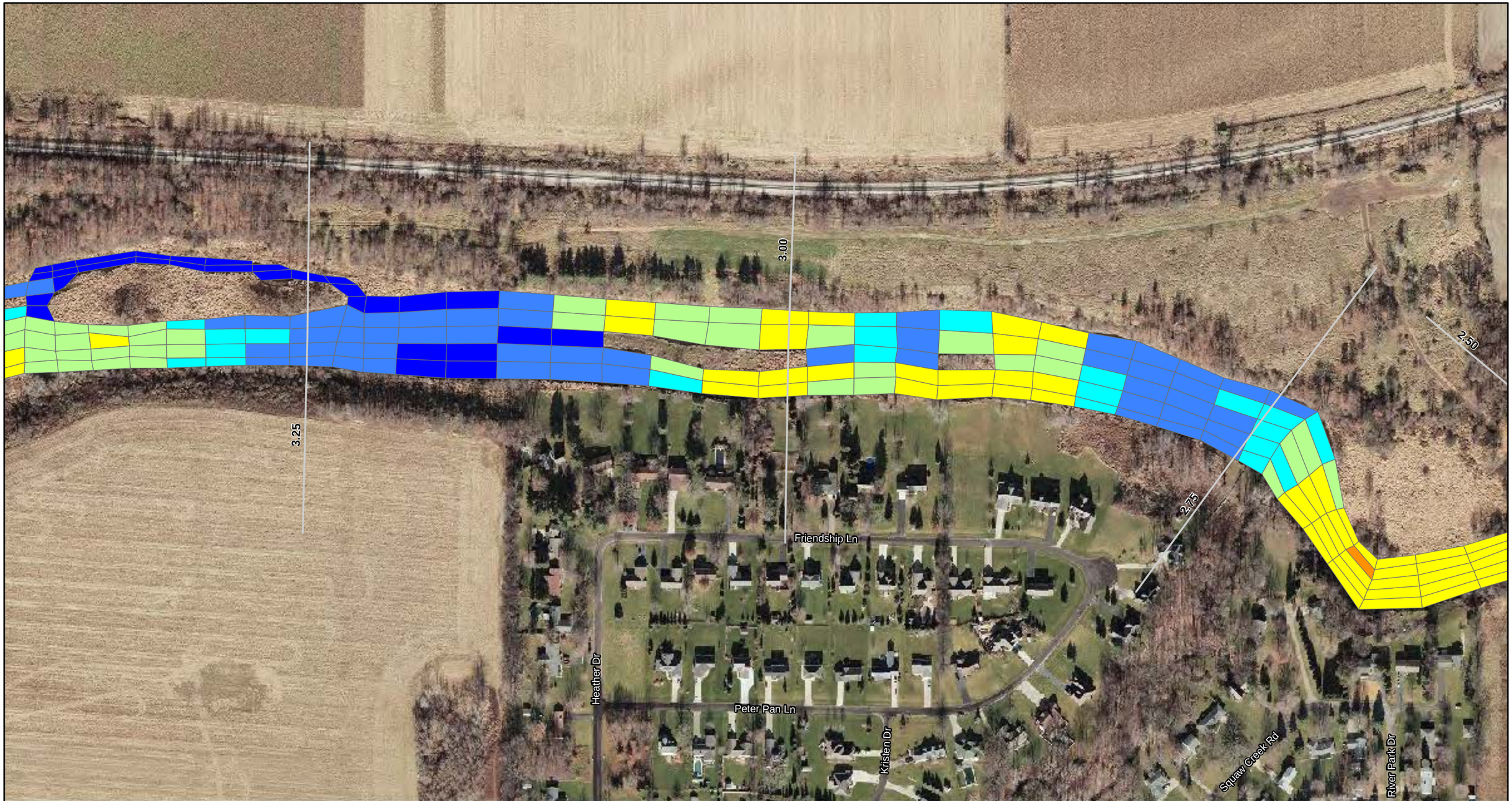
MP 01.95 - MP 02.75

SHEET 1 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

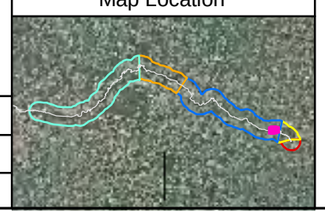
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

MP 02.60 - MP 03.40

SHEET 2 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

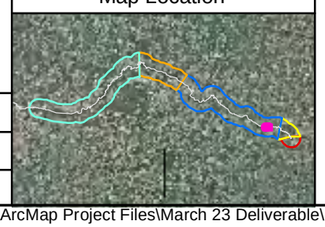
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

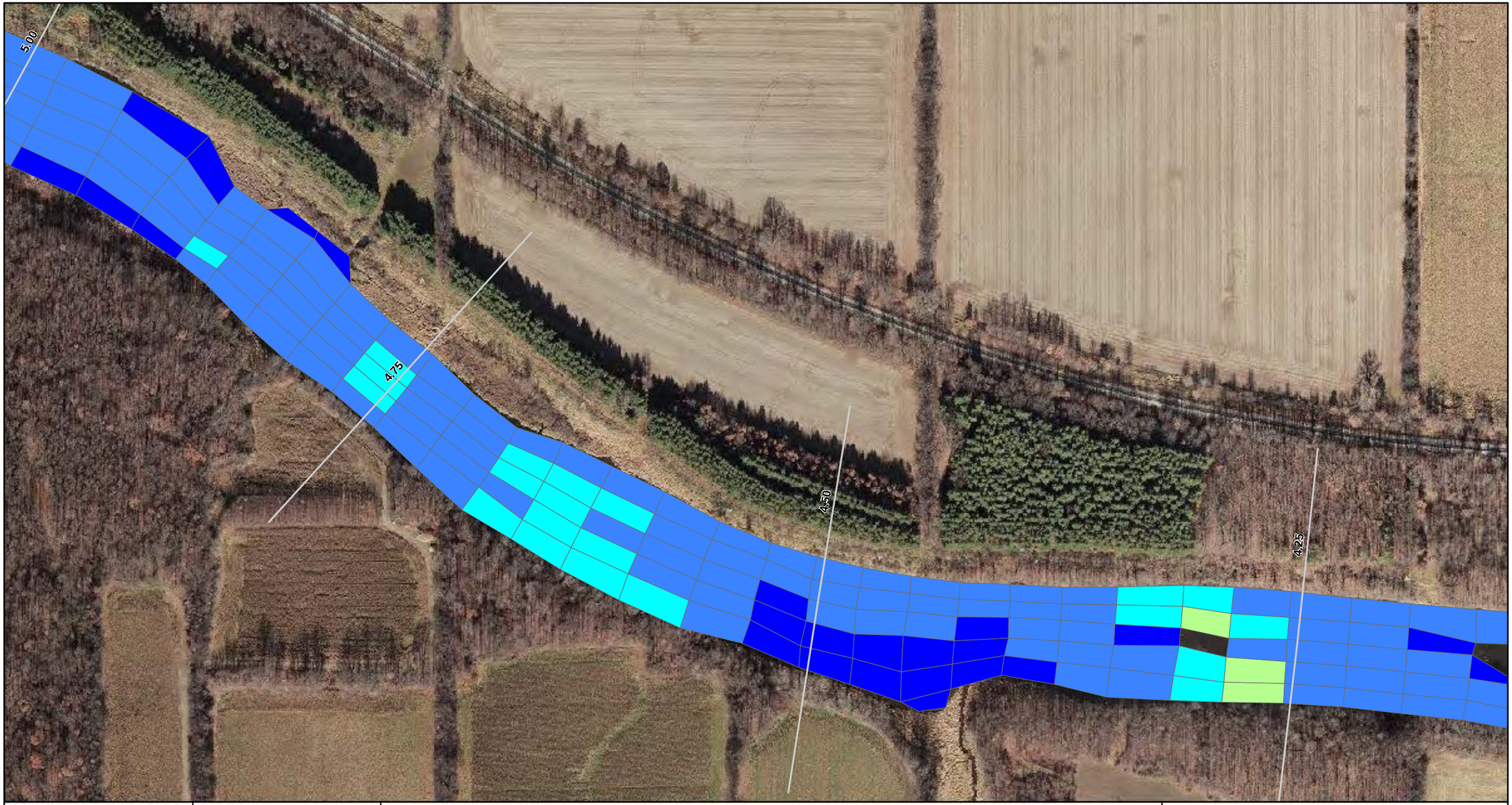
MP 03.40 - MP 04.20

SHEET 3 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

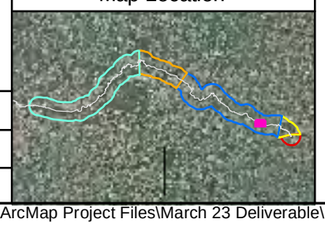
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

Aerial Photography Date: November 2011



ENBRIDGE		
Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011
- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

MP 04.15 - MP 05.00

SHEET 4 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011
- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

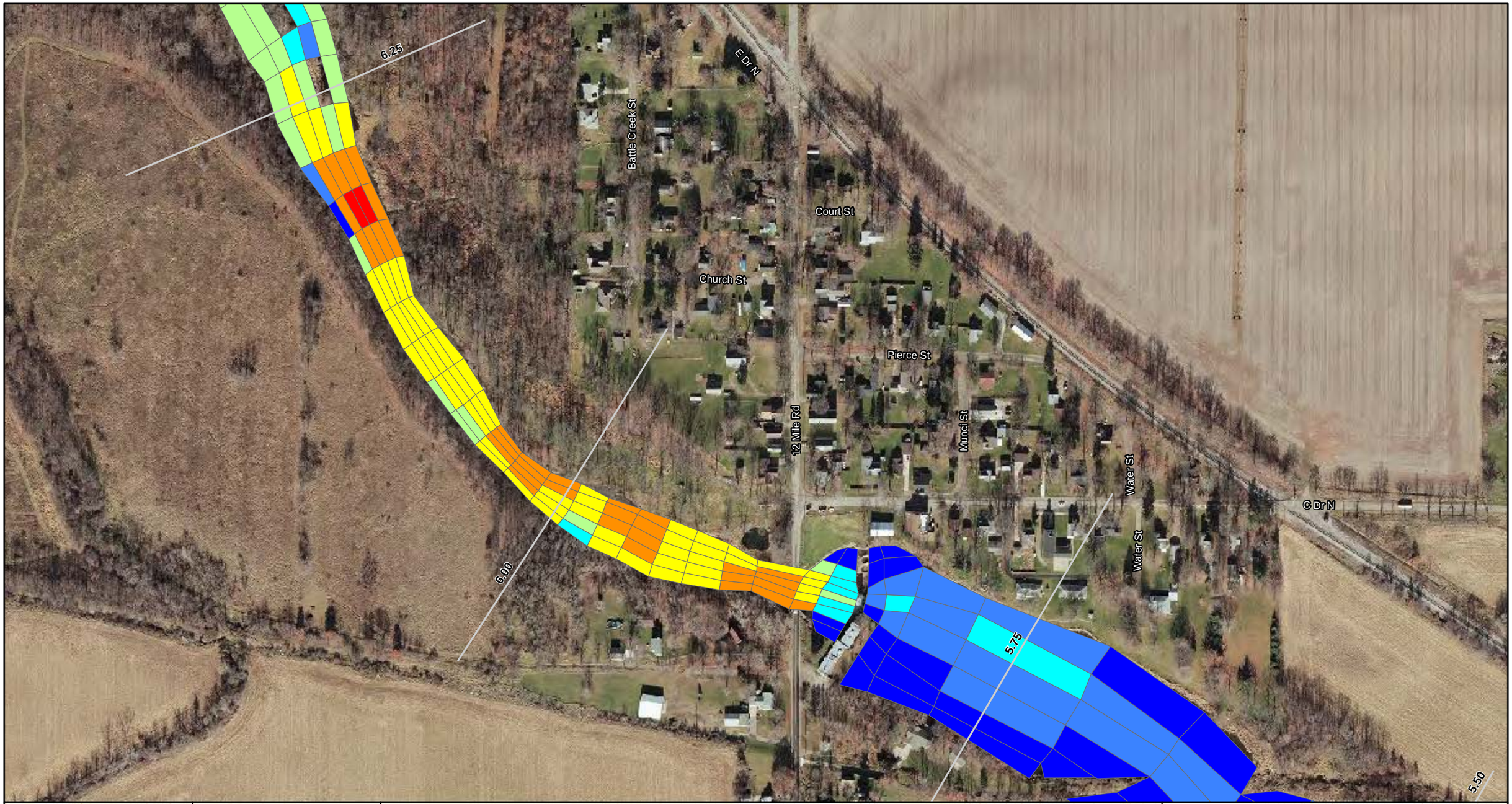
MP 04.90 - MP 05.65

SHEET 5 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

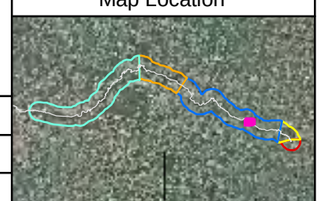
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals

cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

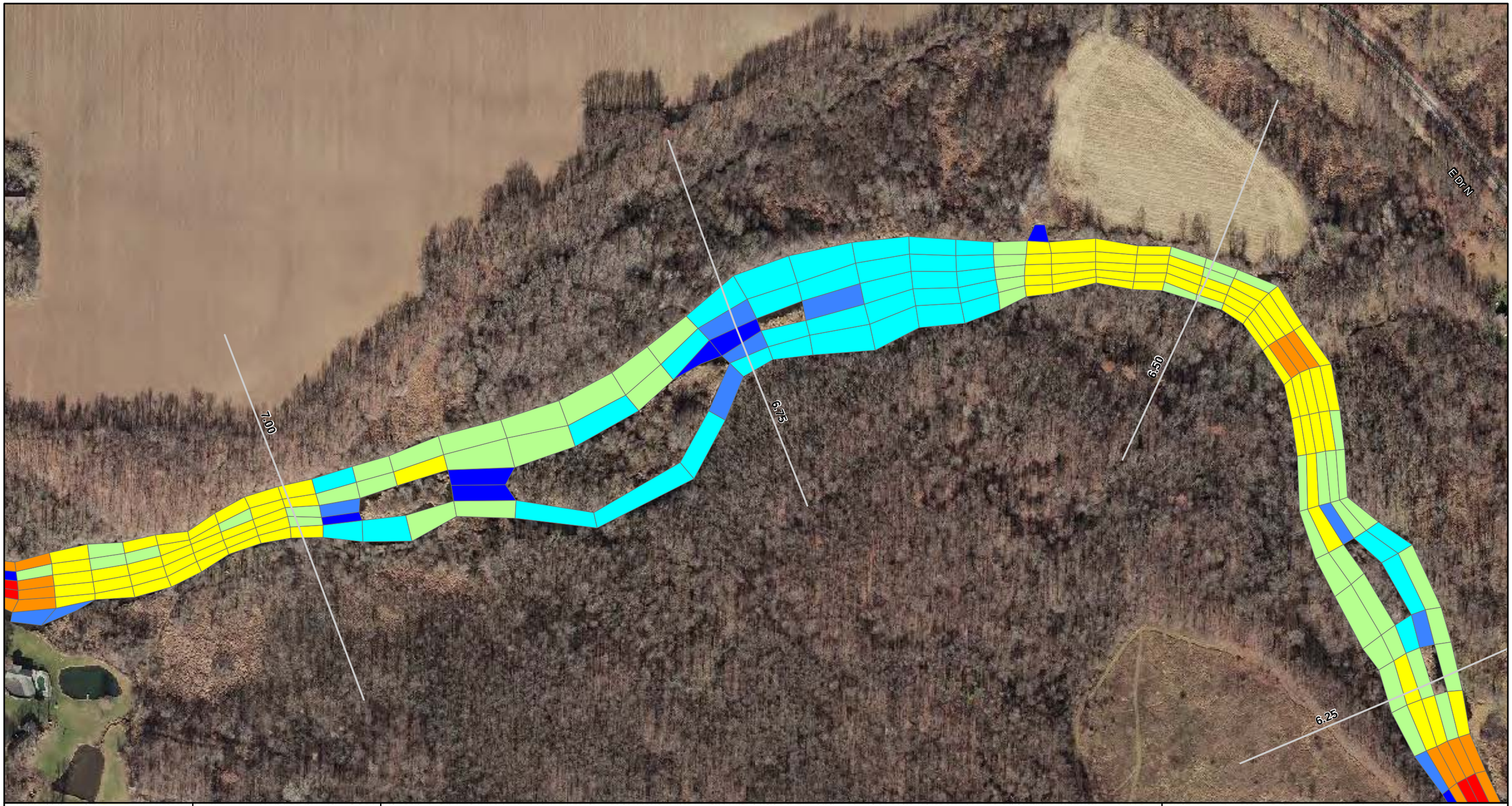
MP 05.65 - MP 06.30

SHEET 6 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

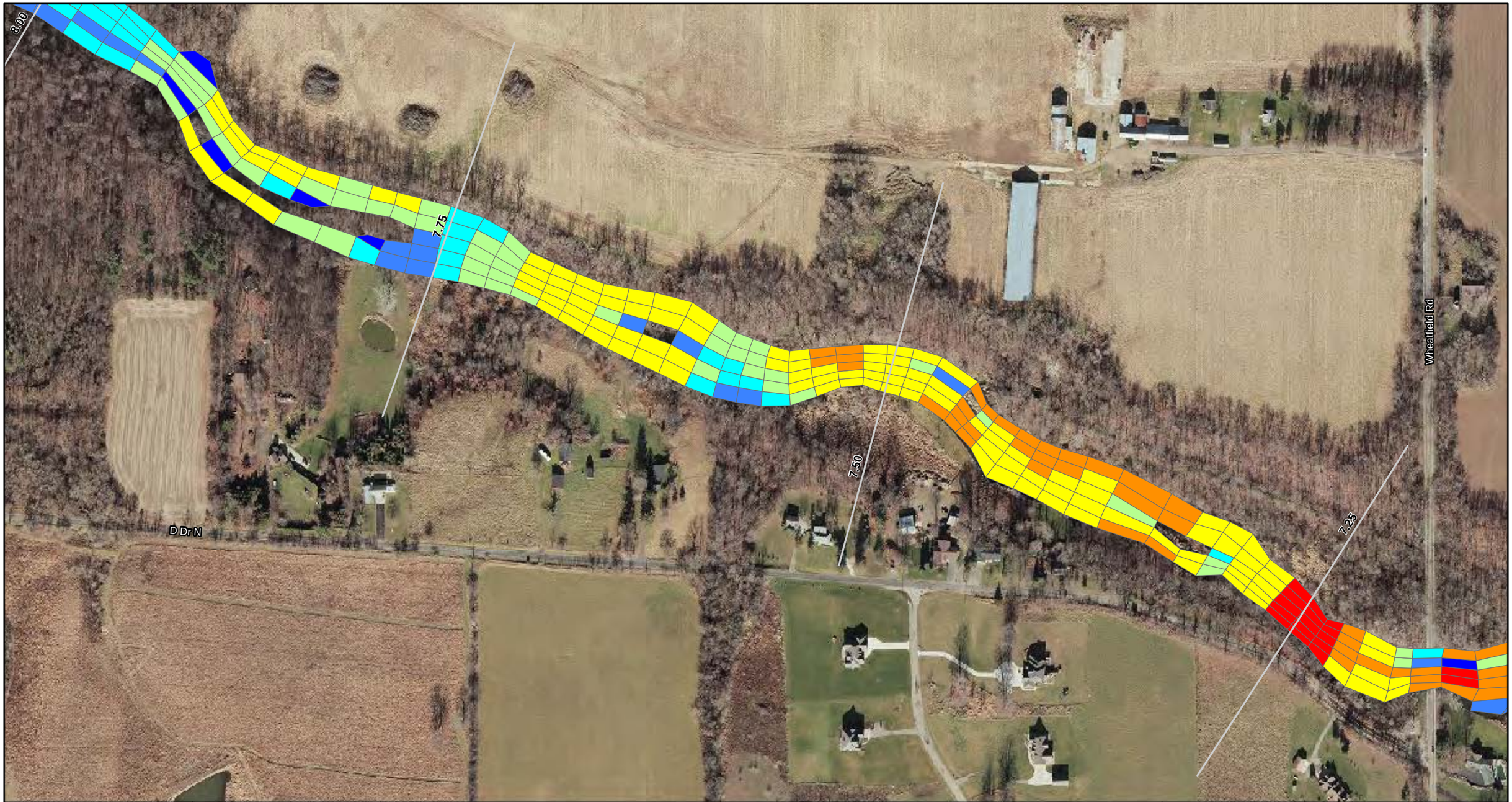
MP 06.20 - MP 07.15

SHEET 7 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals

cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

MP 07.15 - MP 07.95

SHEET 8 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

Aerial Photography Date: November 2011

8.75

8.50

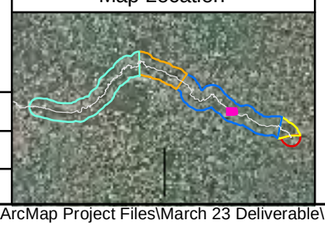
8.25

8.00

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

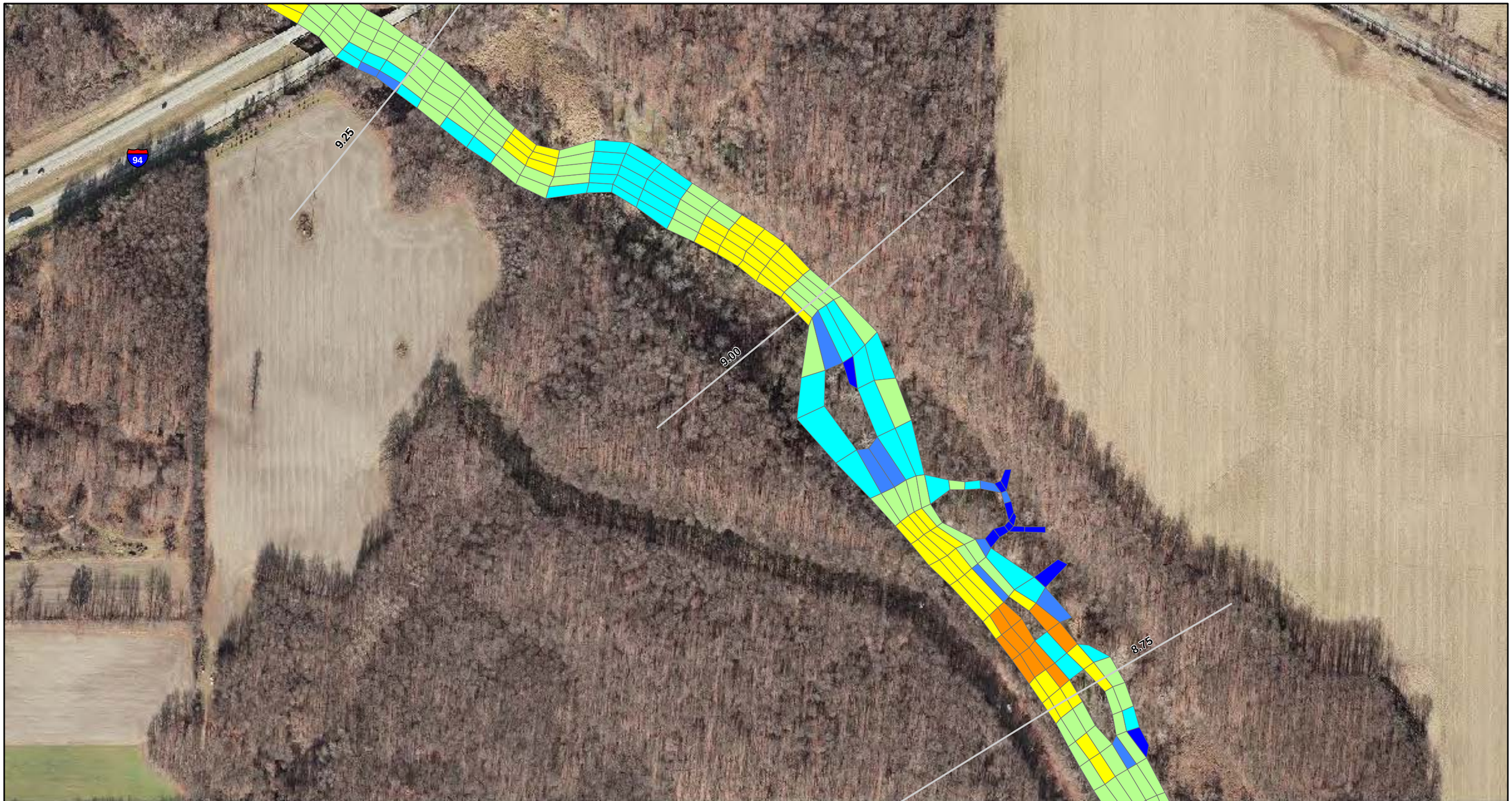
MP 07.90 - MP 08.75

SHEET 9 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

MP 08.70 - MP 09.30

SHEET 10 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals

cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

MP 09.25 - MP 10.05

SHEET 11 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

10.50

10.25

10.00

River Rd E

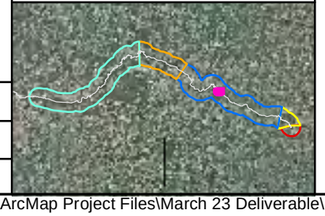
Golden Ave

G Dr N

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals

cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

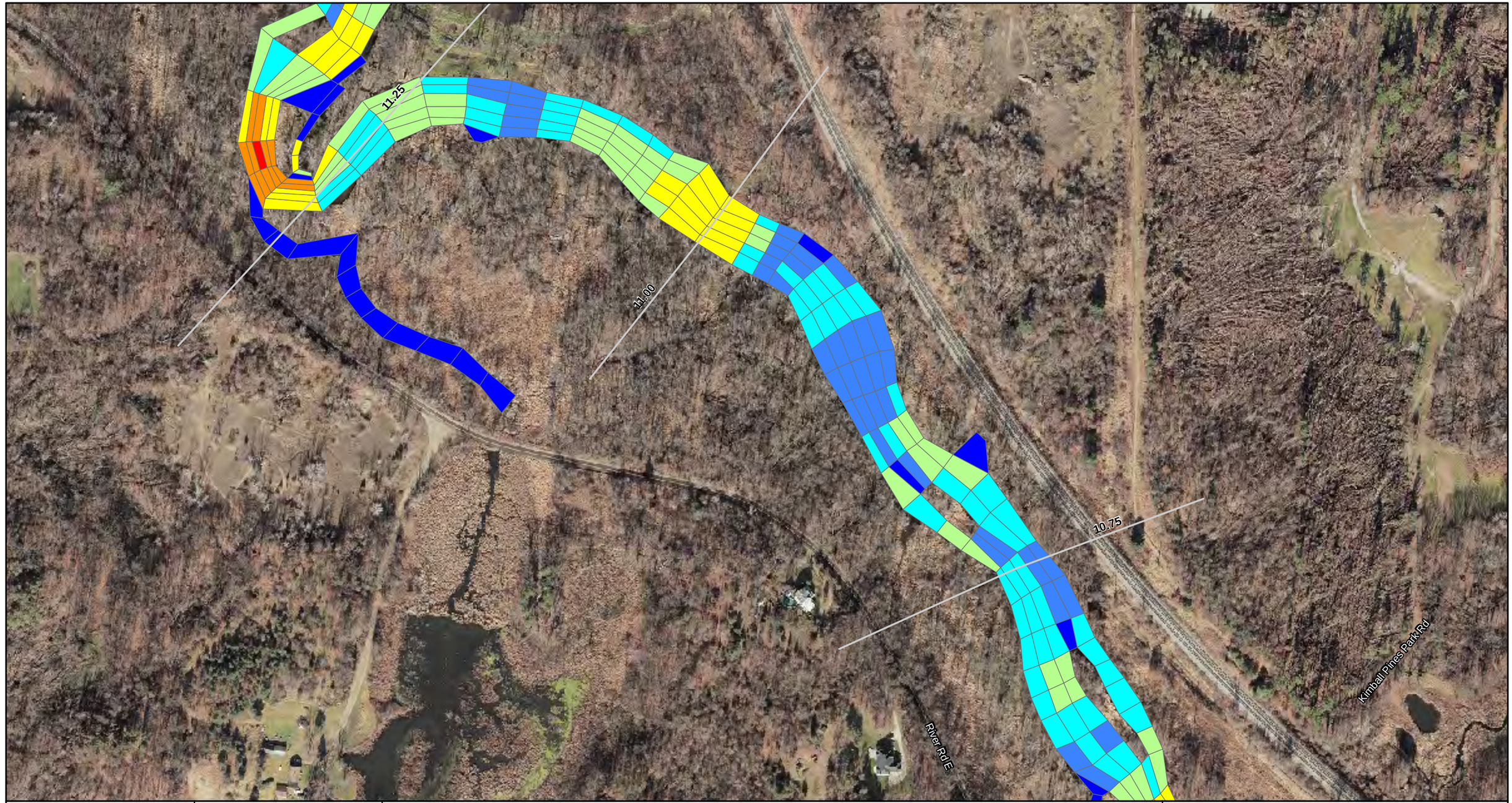
MP 10.00 - MP 10.65

SHEET 12 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

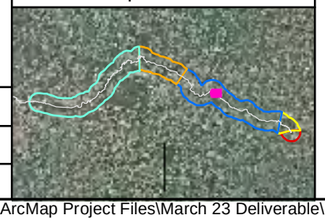
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

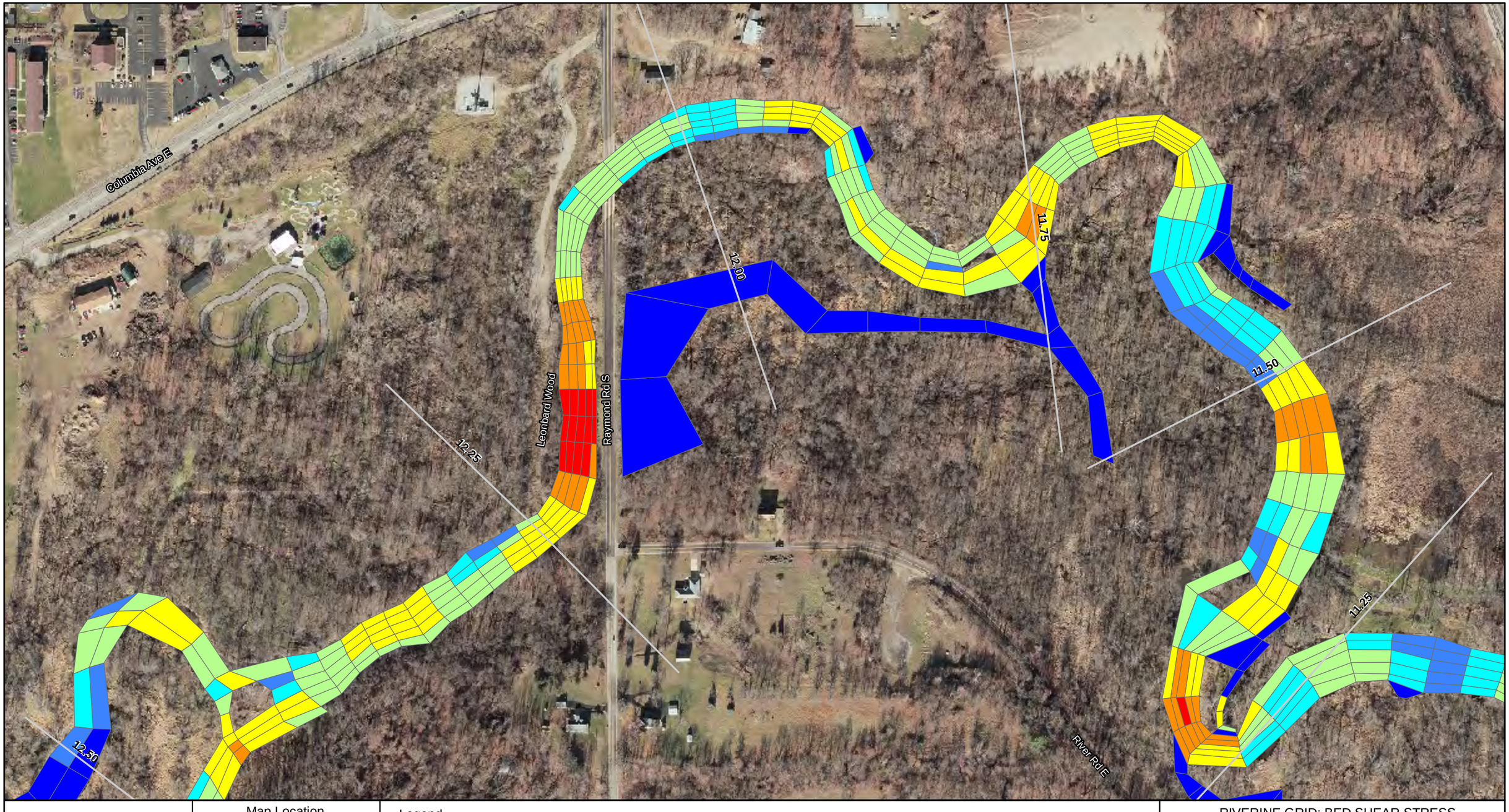
MP 10.60 - MP 11.40

SHEET 13 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

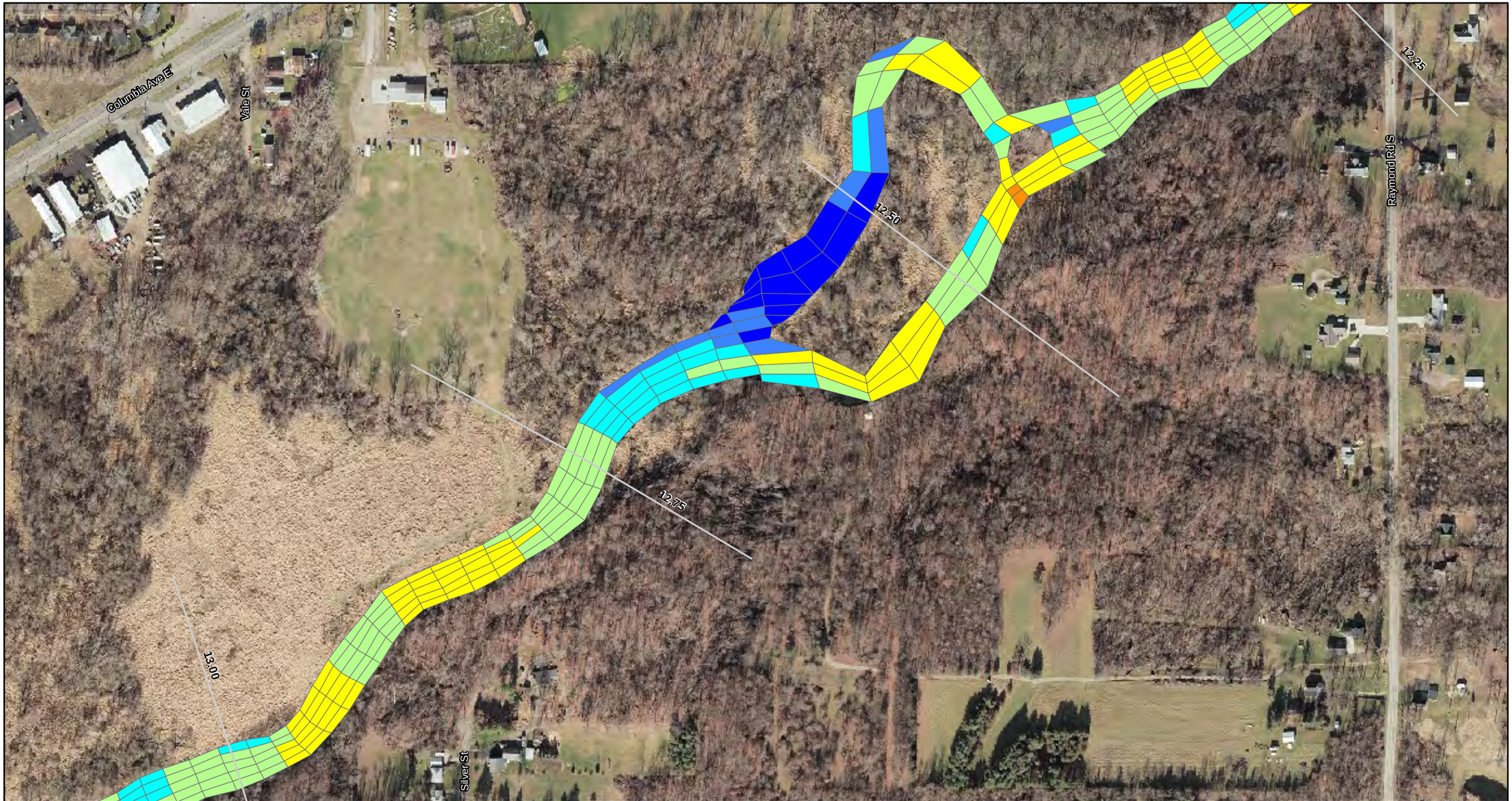
MP 11.10 - MP 12.45

SHEET 14 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011
- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

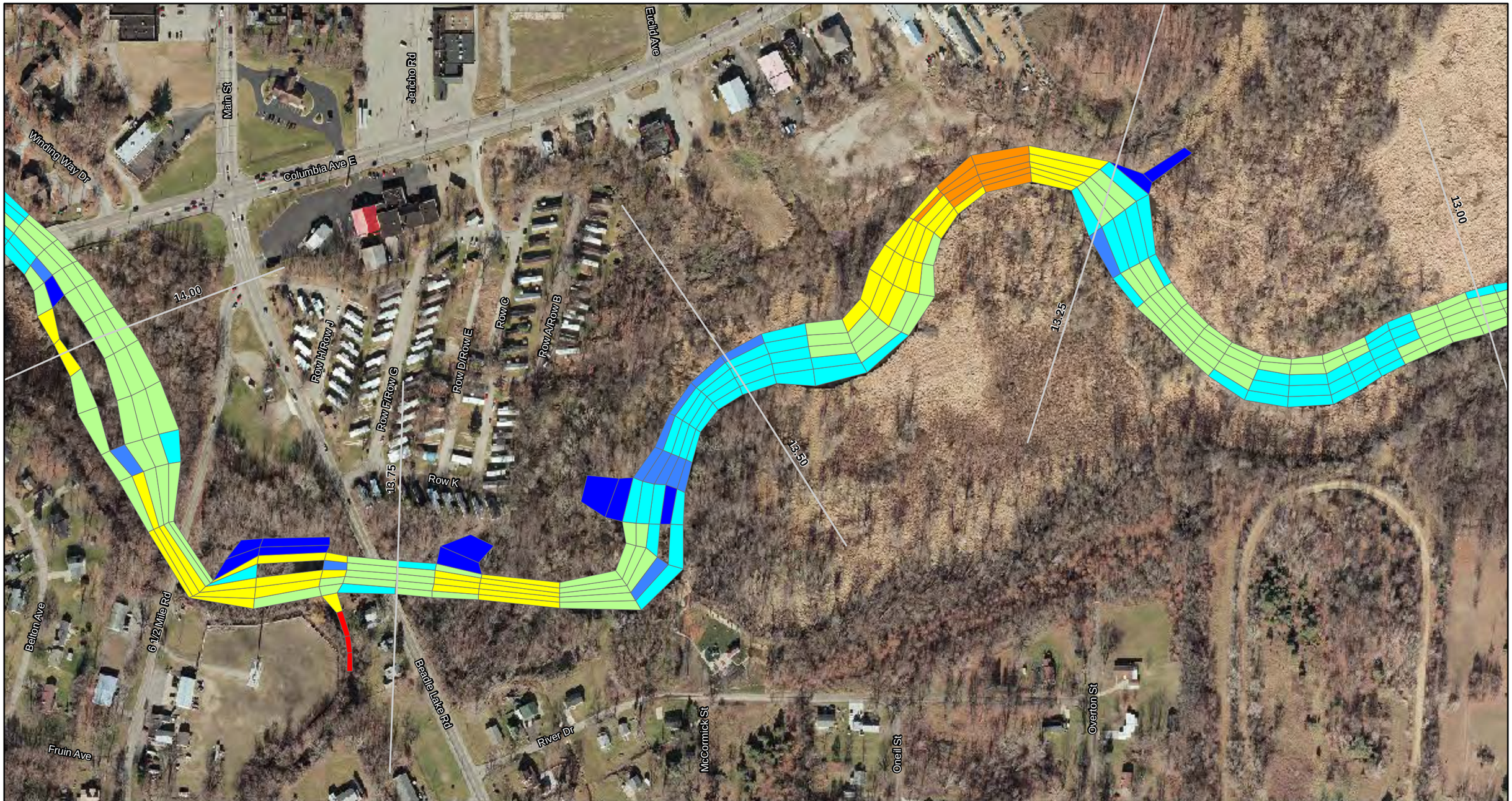
MP 12.30 - MP 13.05

SHEET 15 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011
- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

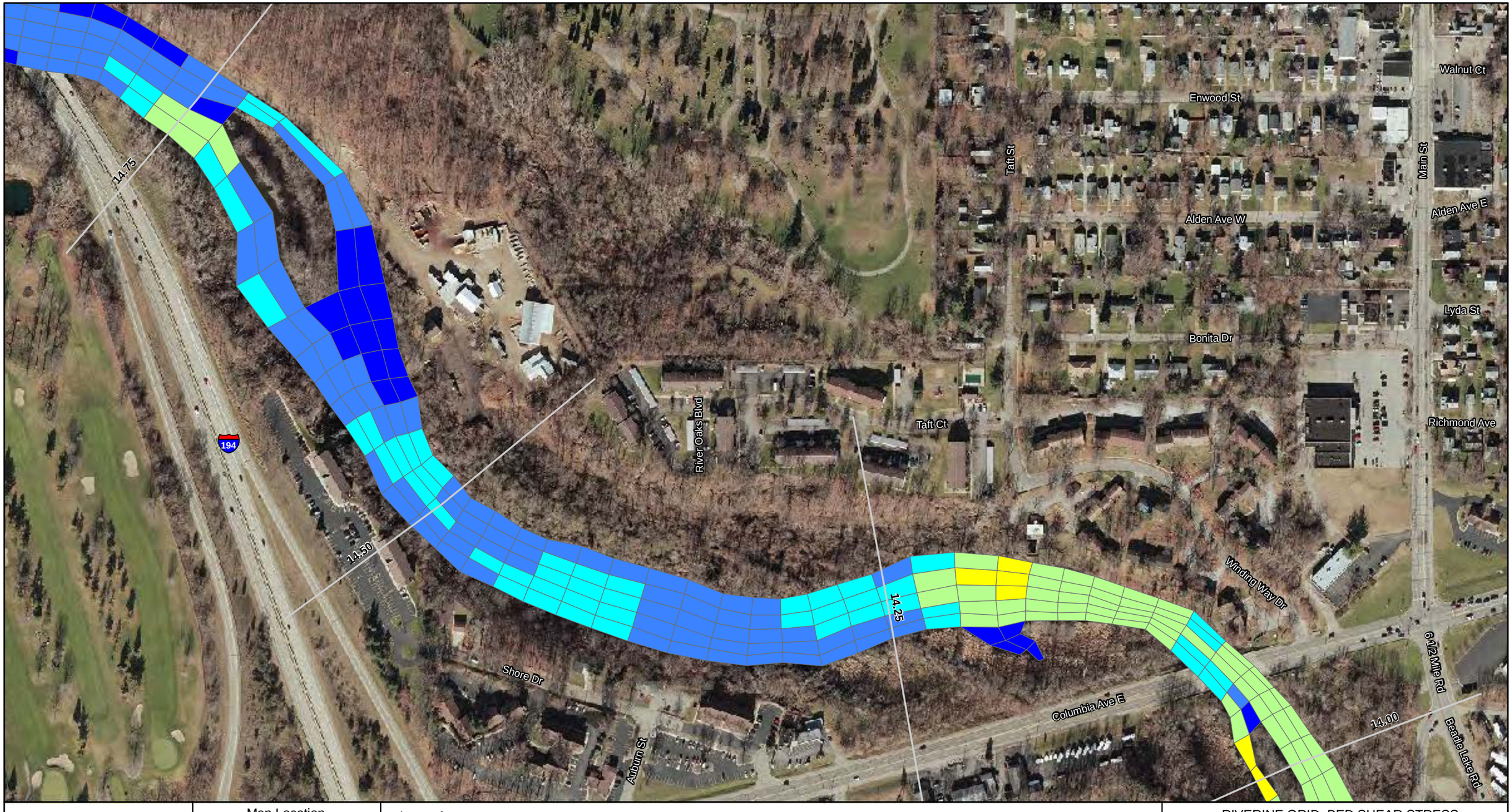
MP 13.00 - MP 14.10

SHEET 16 OF 56

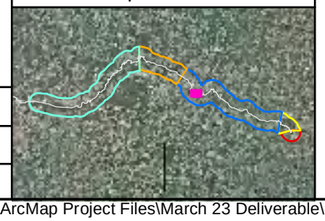
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

Aerial Photography Date: November 2011



Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals

cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

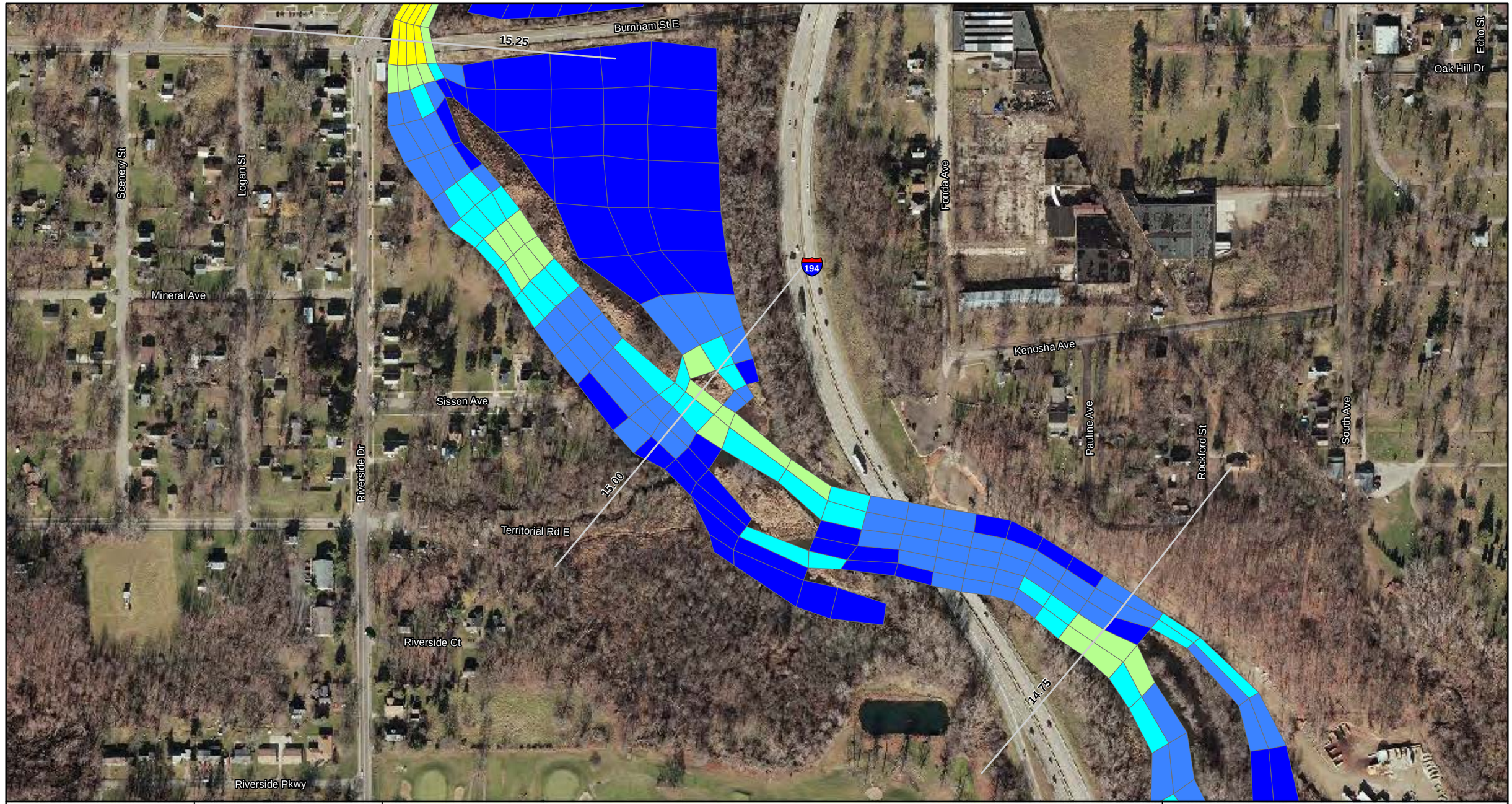
MP 14.00 - MP 14.85

SHEET 17 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

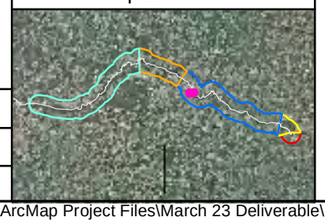
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
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- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals

cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

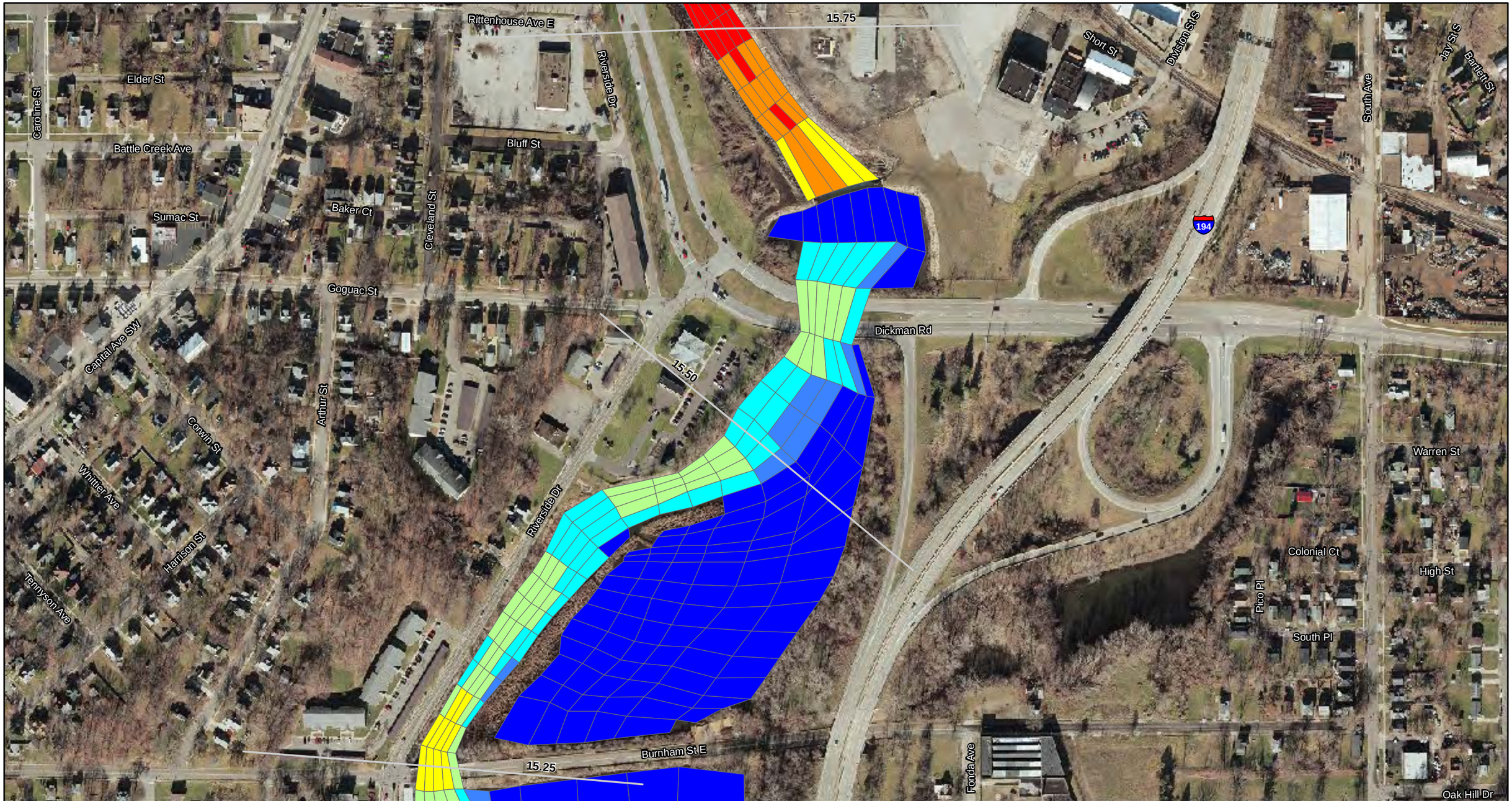
MP 14.65 - MP 15.25

SHEET 18 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

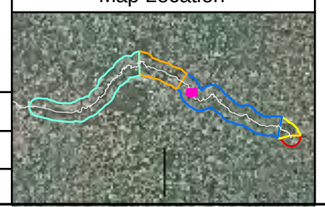
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

Aerial Photography Date: November 2011



Drawn:	BRS 3/22/2012
Approved:	DBR 3/22/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals

cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

MP 15.25 - MP 15.75

SHEET 19 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

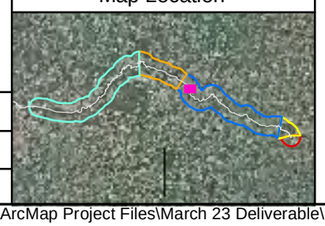
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

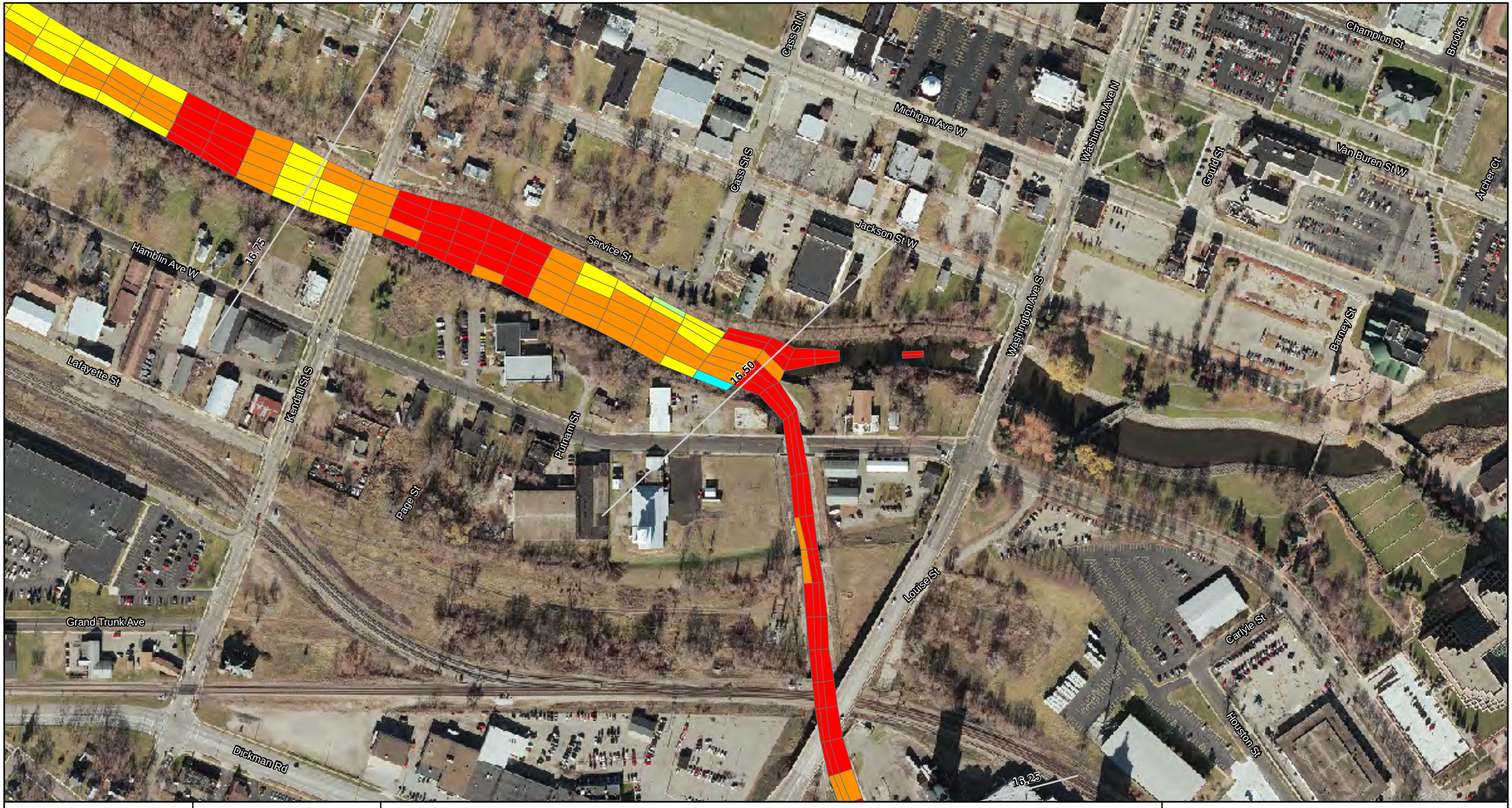
MP 15.75 - MP 16.30

SHEET 20 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

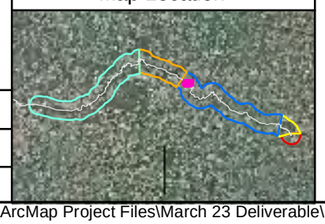
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

MP 16.30 - MP 16.95

SHEET 21 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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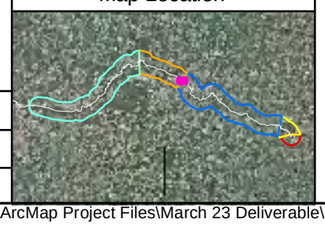
Aerial Photography Date: November 2011

Jackson St W
Grand Ave
Van Buren St W
Graves Ave
Graves Ave
Lemont St
Hubbard St
Manchester St W
17.30
17.25
15th St N
14th St N
12th St N
Jordan St
Turner St
Michigan Ave W
Thorne St
17.00
Wood St S
Lafayette Ave
14th St N
Butler St
Hamblin Ave W
Parish St
Angell St
Lafayette St
E Ave

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals

cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

MP 16.85 - MP 17.60

SHEET 22 OF 56

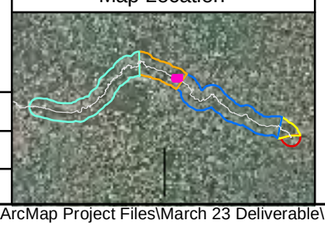
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

Aerial Photography Date: November 2011



Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
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- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

MP 17.60 - MP 18.40

SHEET 23 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

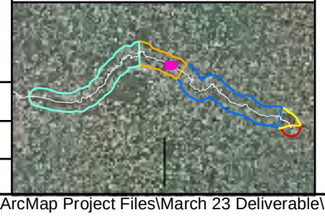
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
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- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

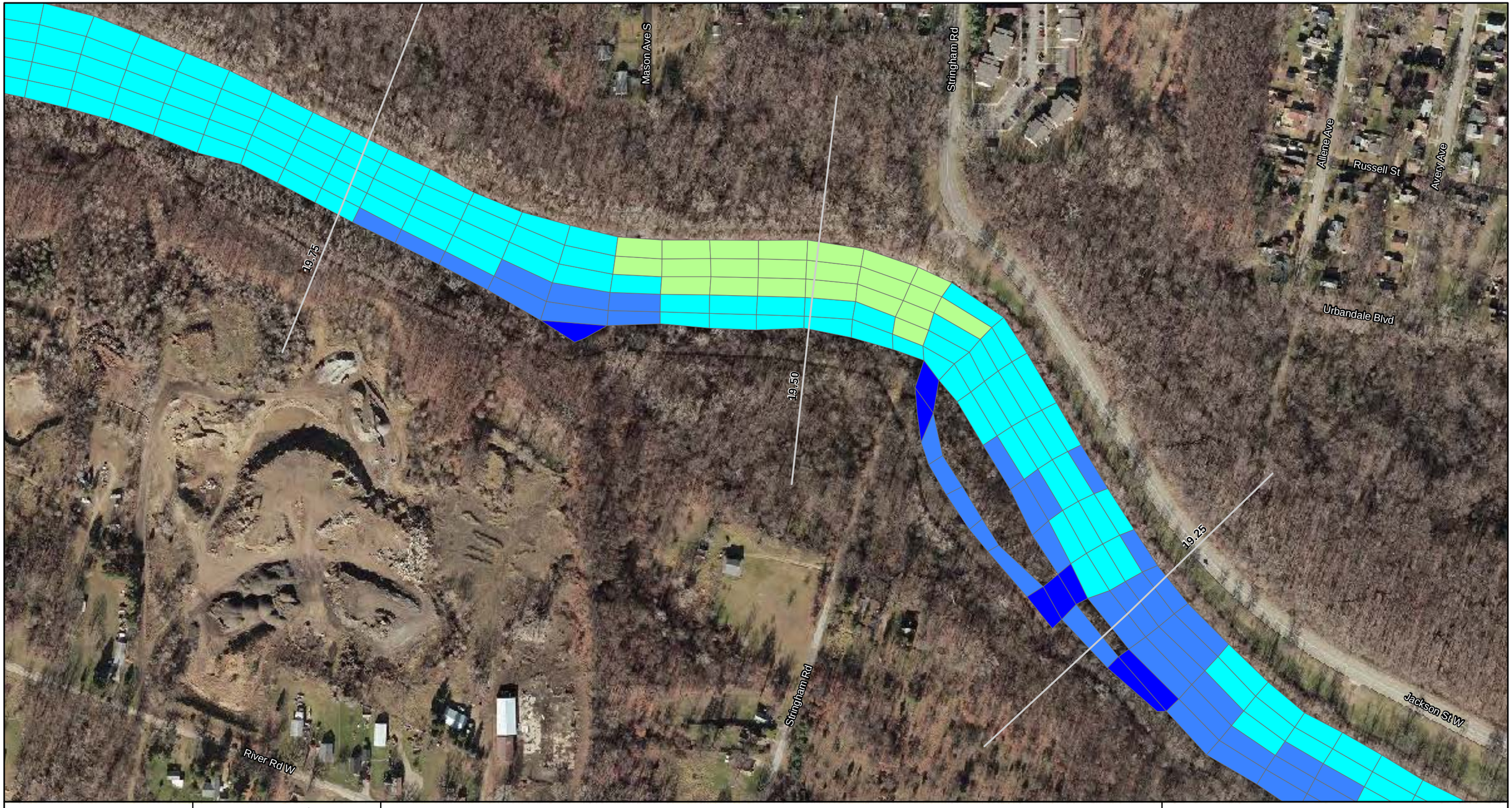
MP 18.30 - MP 19.15

SHEET 24 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

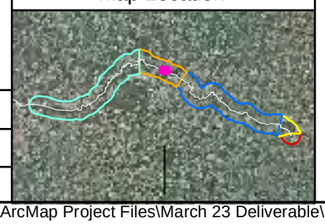
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

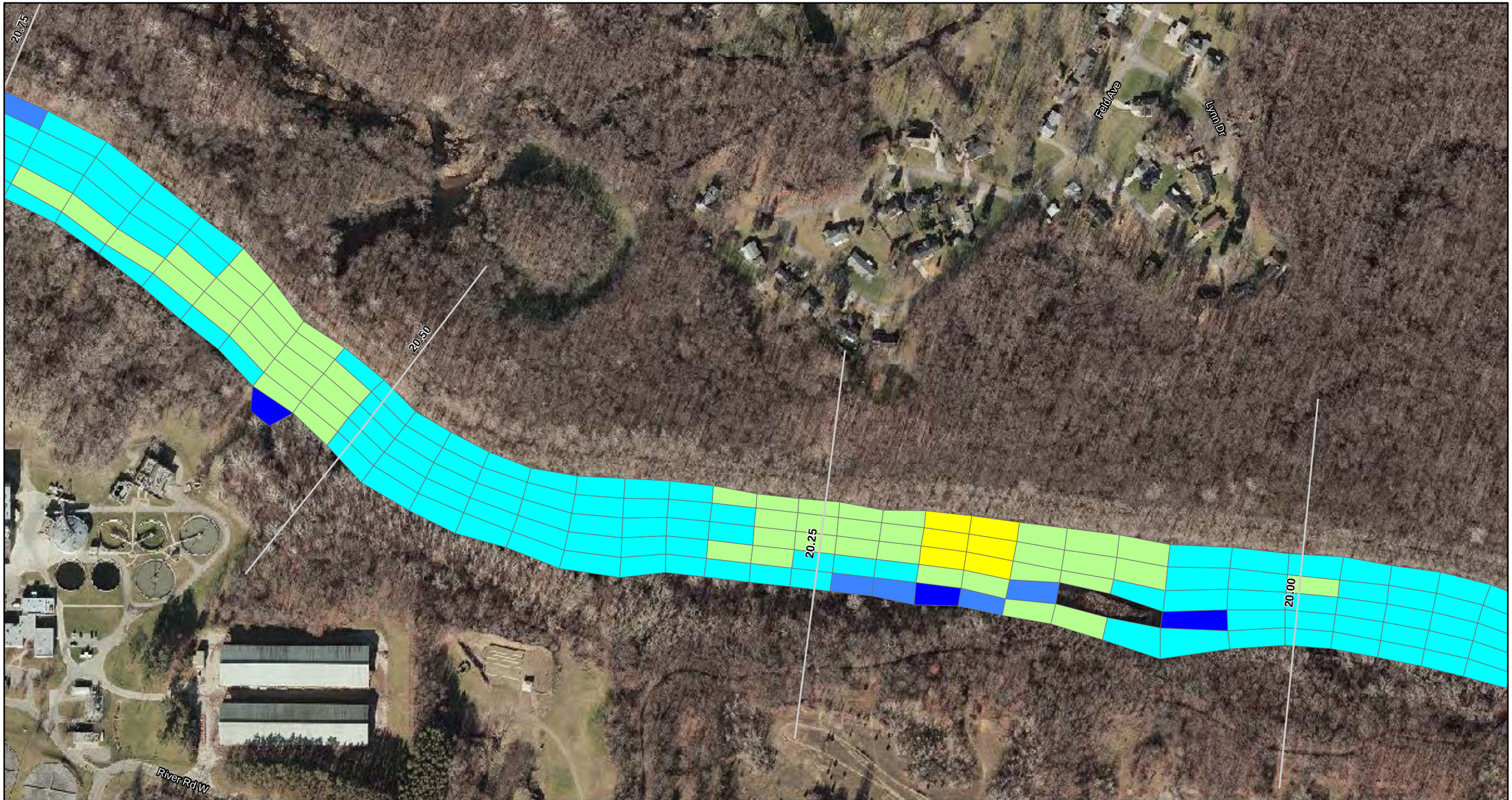
MP 19.10 - MP 19.95

SHEET 25 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

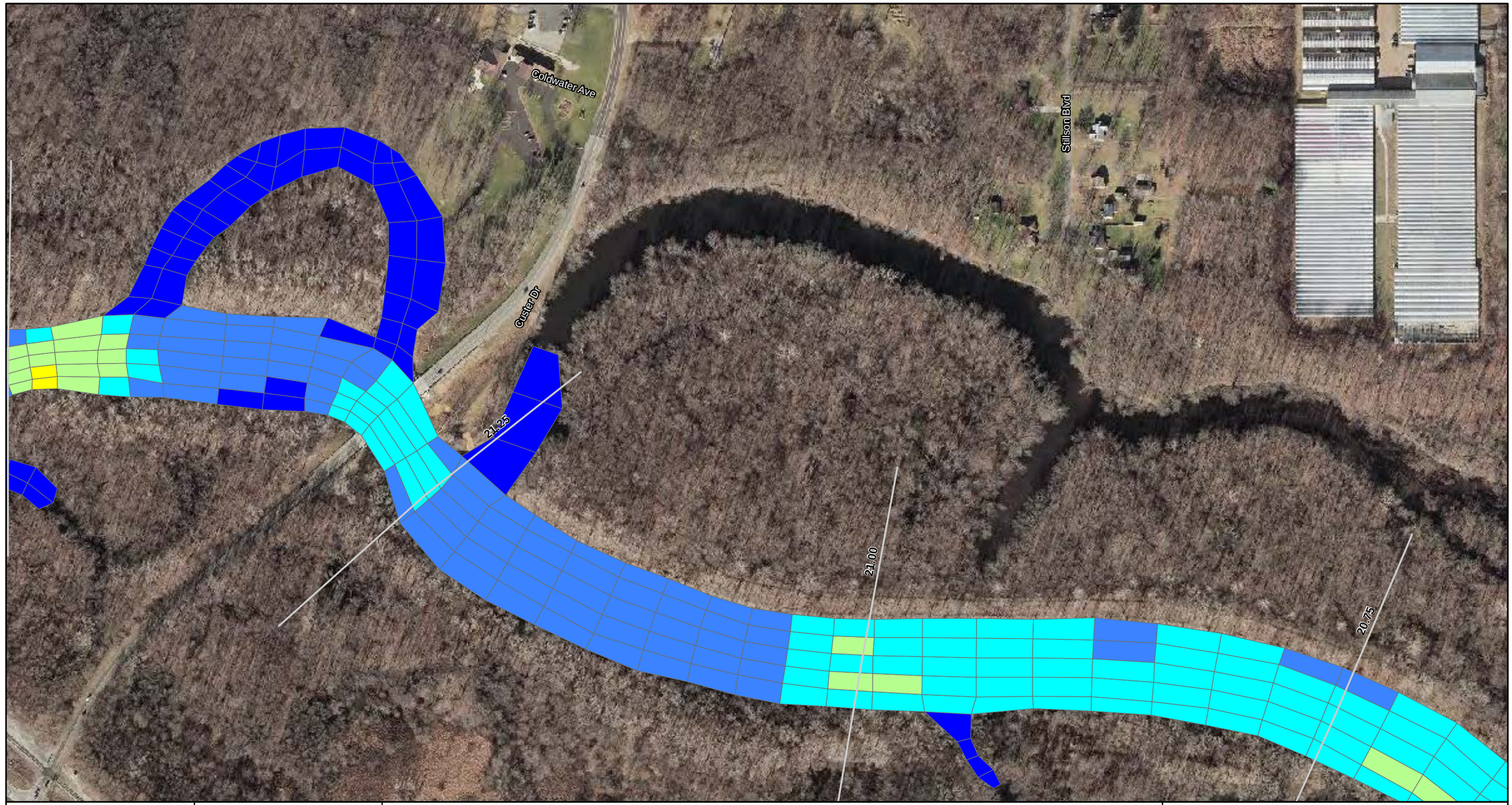
MP 19.90 - MP 20.75

SHEET 26 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

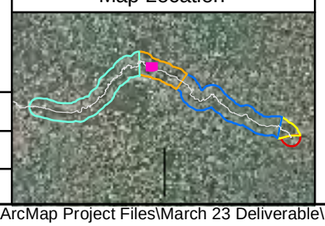
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

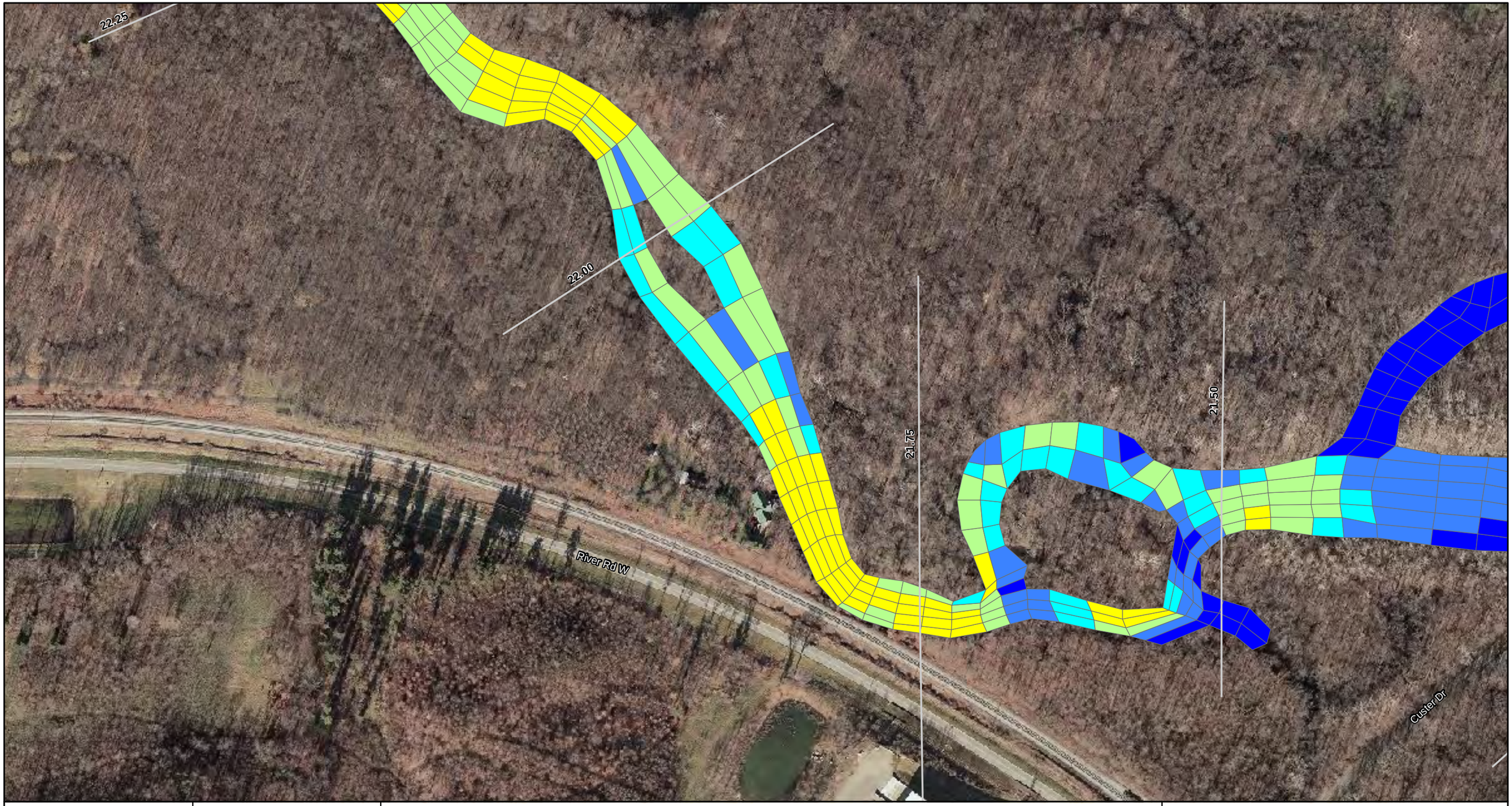
MP 20.70 - MP 21.50

SHEET 27 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

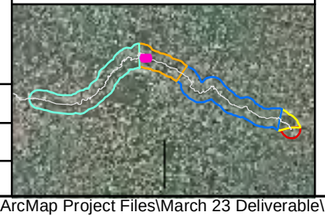
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

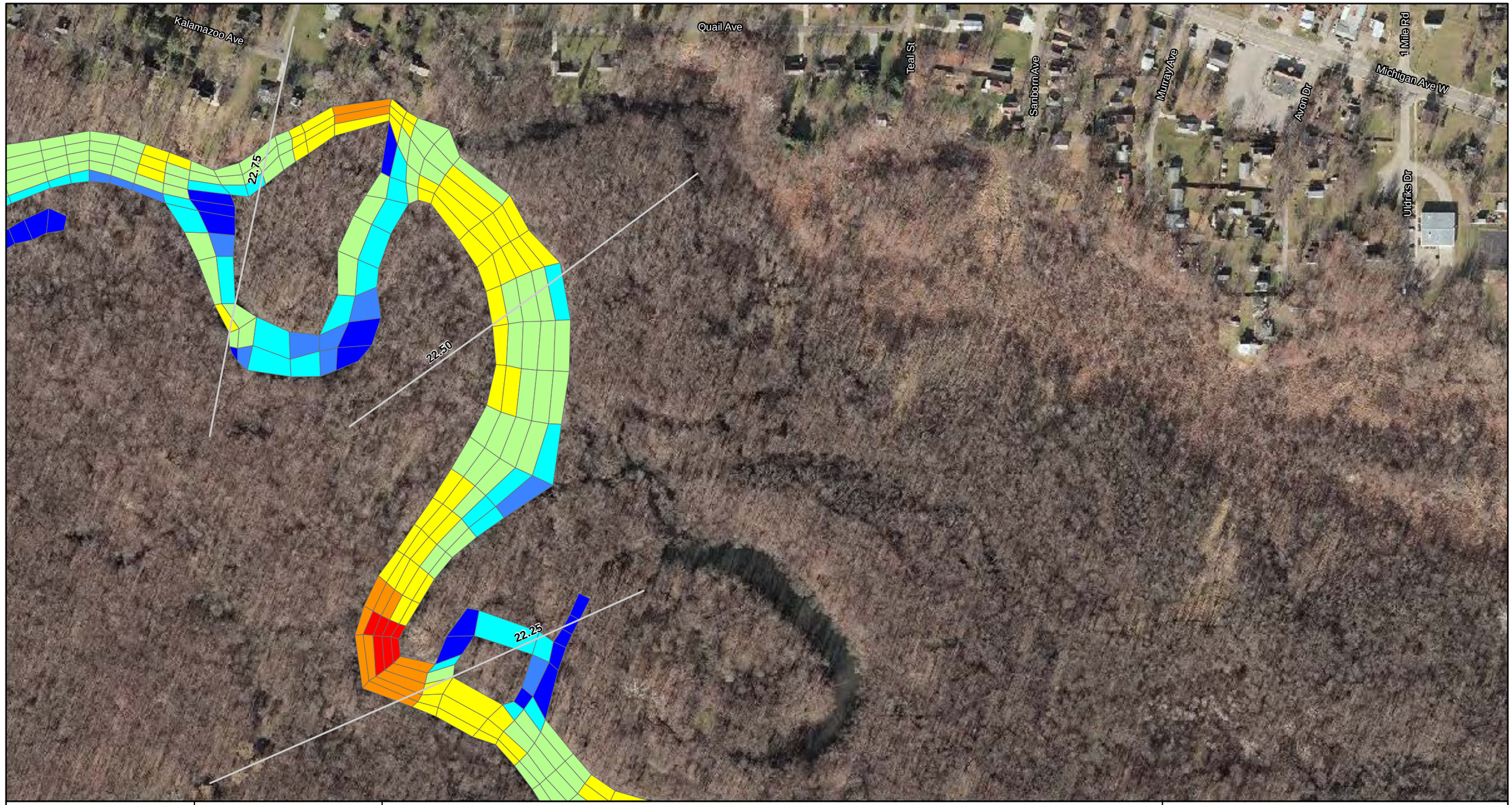
MP 21.35 - MP 22.15

SHEET 28 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

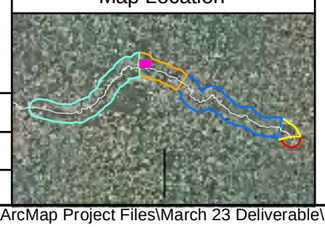
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011
- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

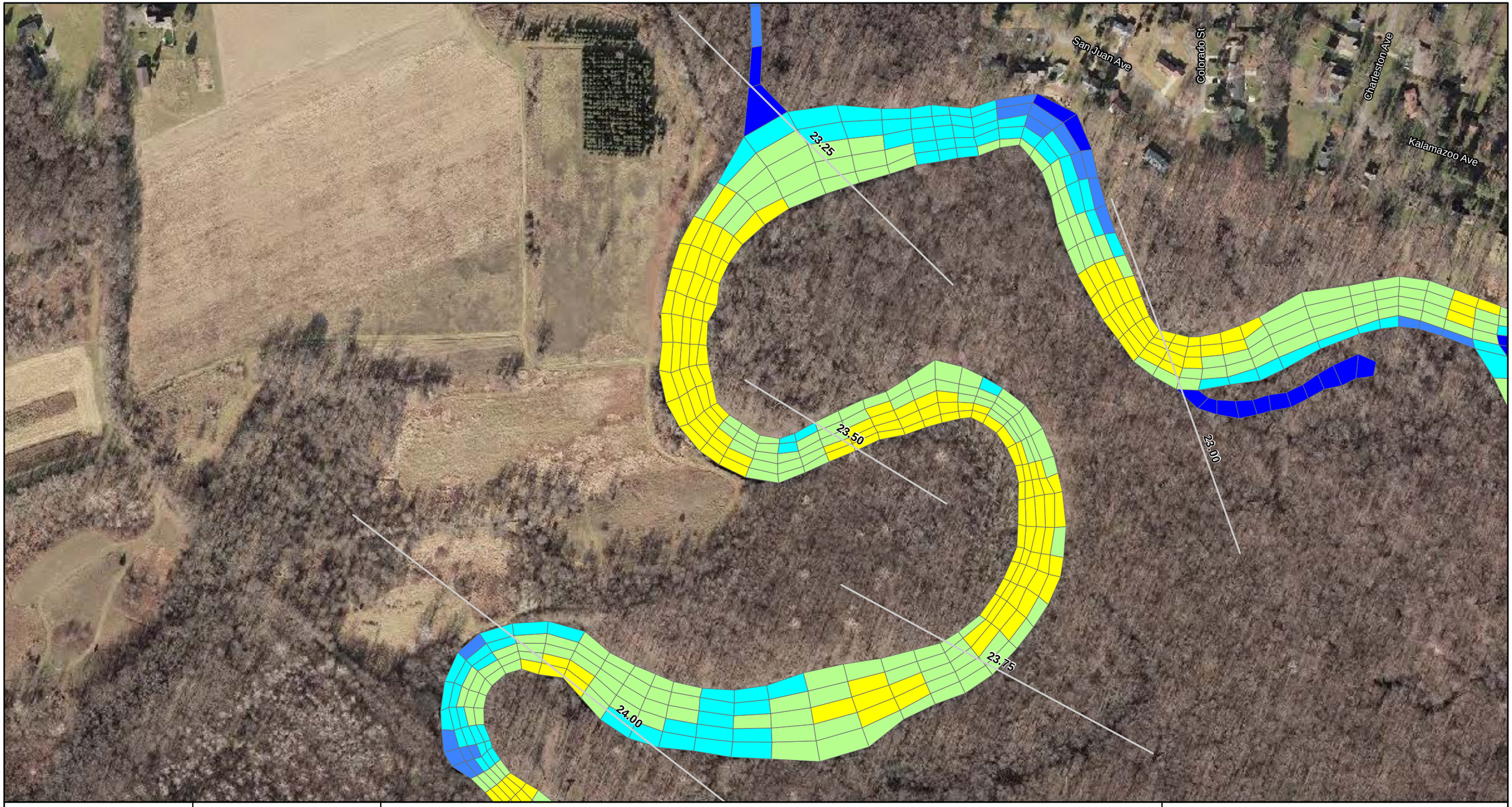
MP 22.15 - MP 22.90

SHEET 29 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

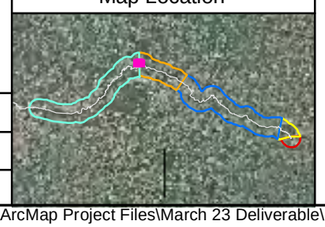
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

MP 22.80 - MP 24.10

SHEET 30 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011
- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

MP 24.10 - MP 24.85

SHEET 31 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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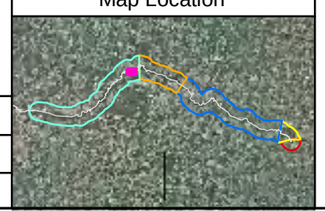
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

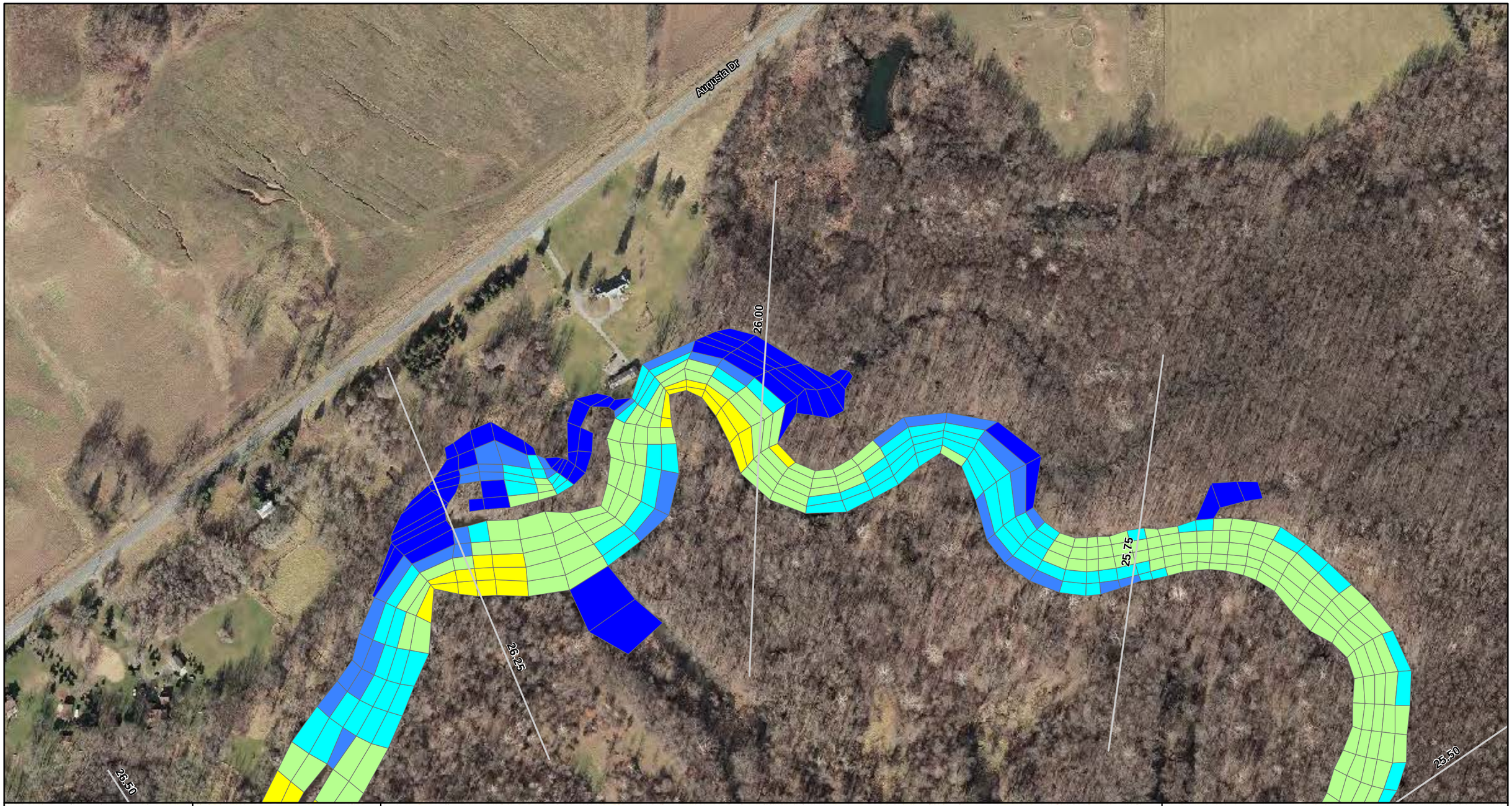
MP 24.80 - MP 25.65

SHEET 32 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

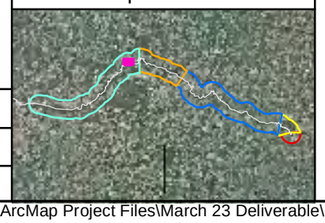
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

Aerial Photography Date: November 2011



Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011
- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

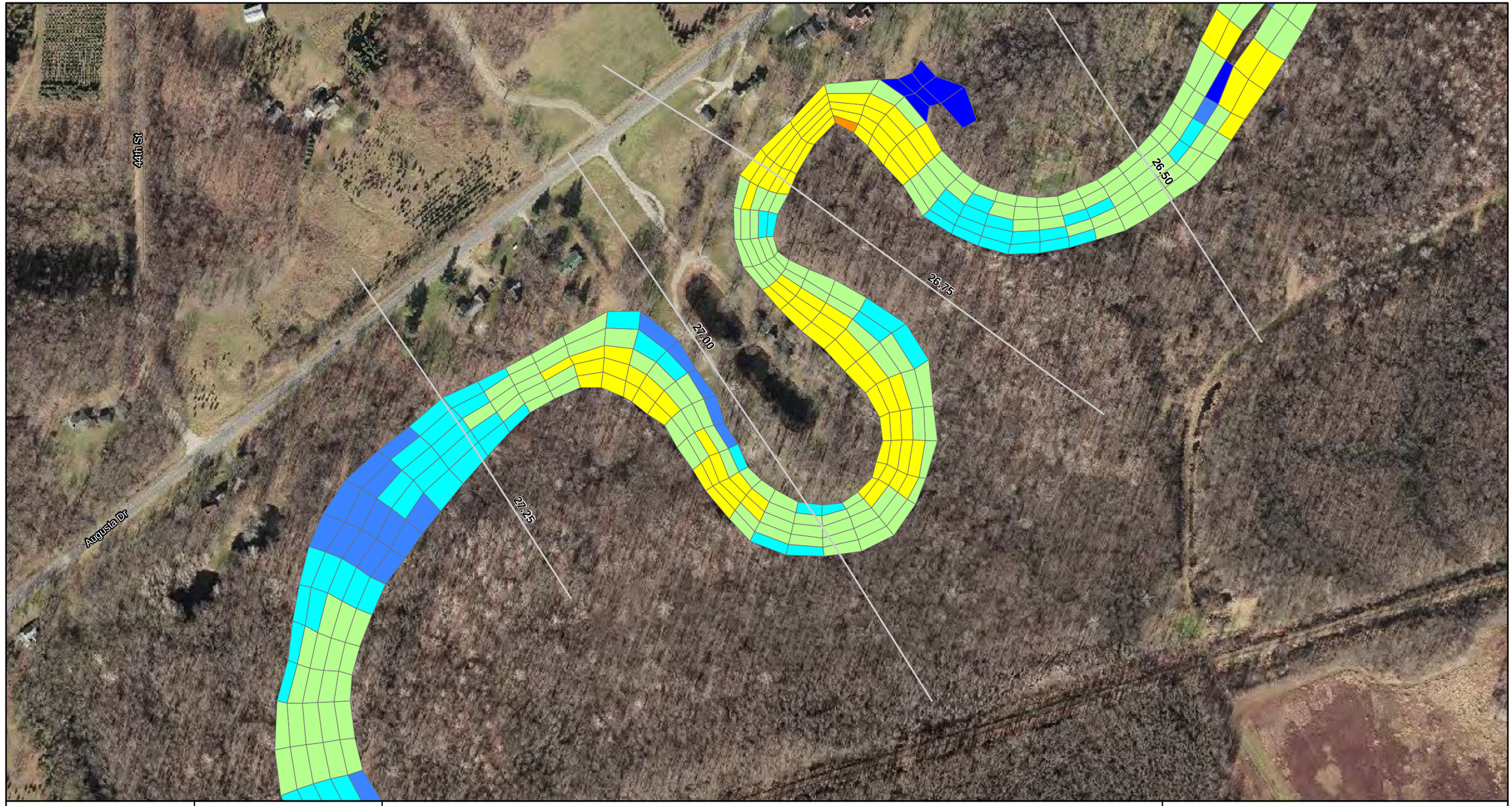
MP 25.55 - MP 26.40

SHEET 33 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

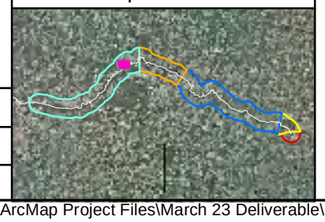
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011
- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

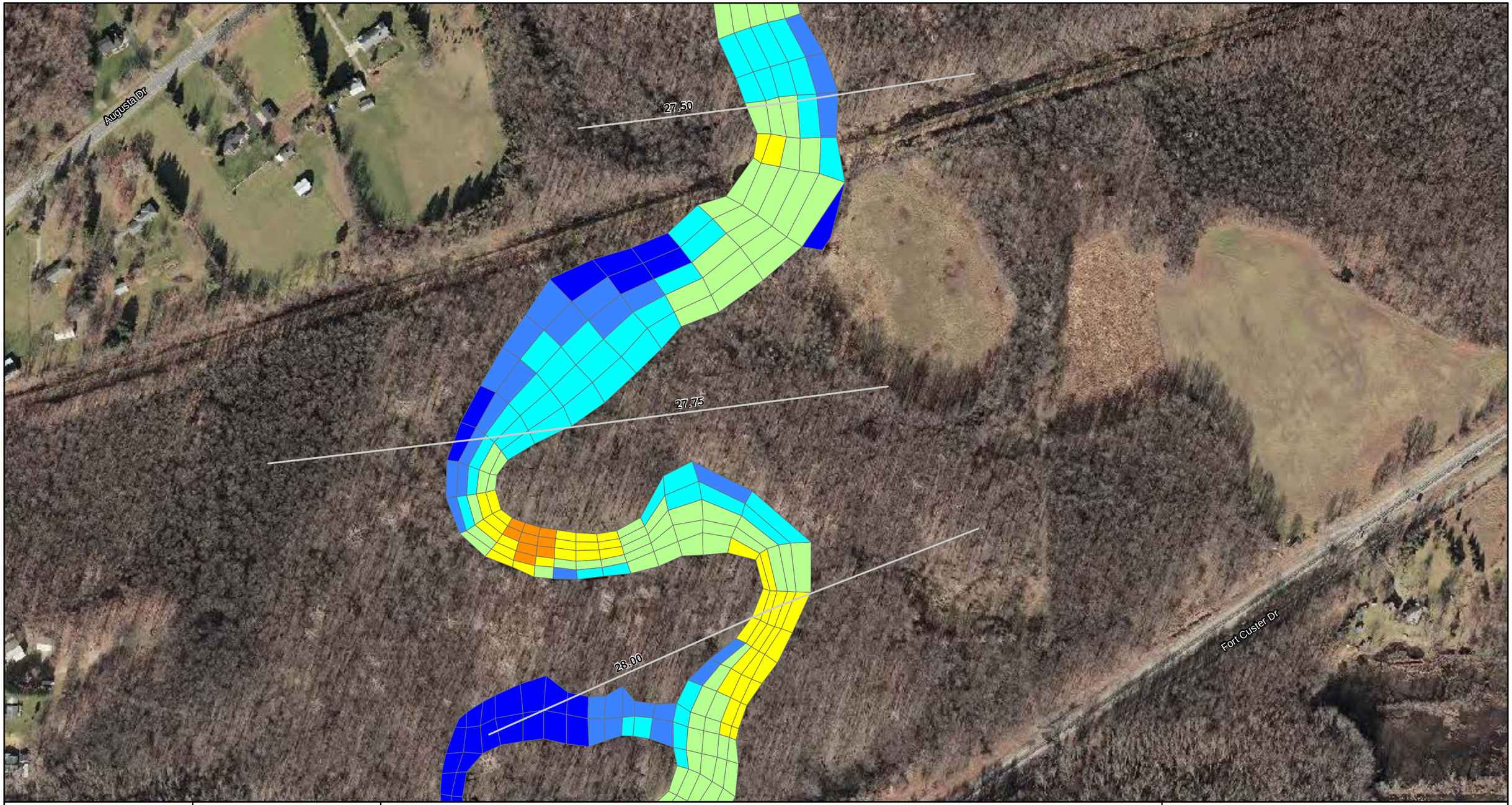
MP 26.40 - MP 27.45

SHEET 34 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

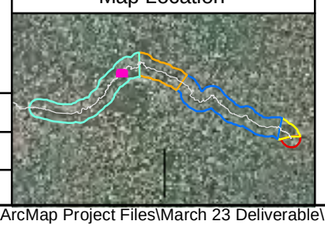
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

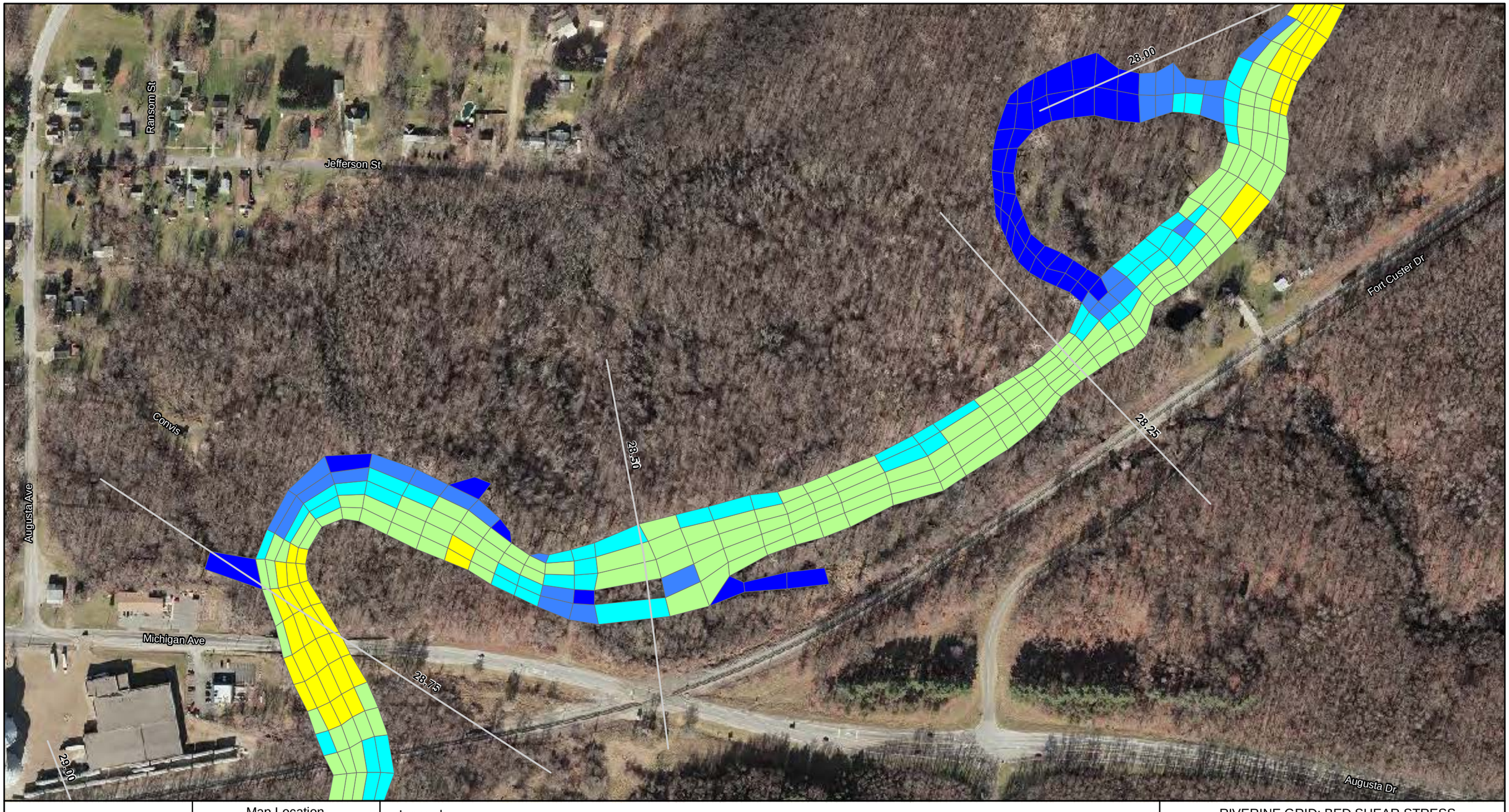
MP 27.45 - MP 28.10

SHEET 35 OF 56

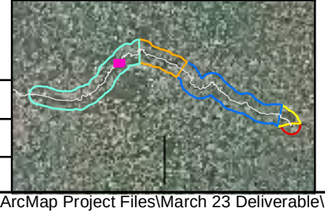
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

Aerial Photography Date: November 2011



Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals

cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

MP 28.05 - MP 28.85

SHEET 36 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals

cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

MP 28.85 - MP29.55

SHEET 37 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

29.50

29.75

Fort Custer Rec Area Service

Fort Custer Rec Area Access

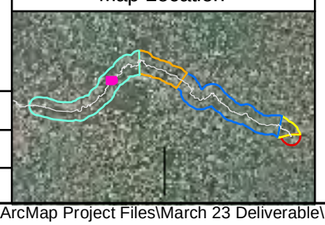
30.25

30.00

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals

cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

MP 29.50 - MP29.95

SHEET 38 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals

cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

MP 29.95 - MP 30.80

SHEET 39 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011
- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

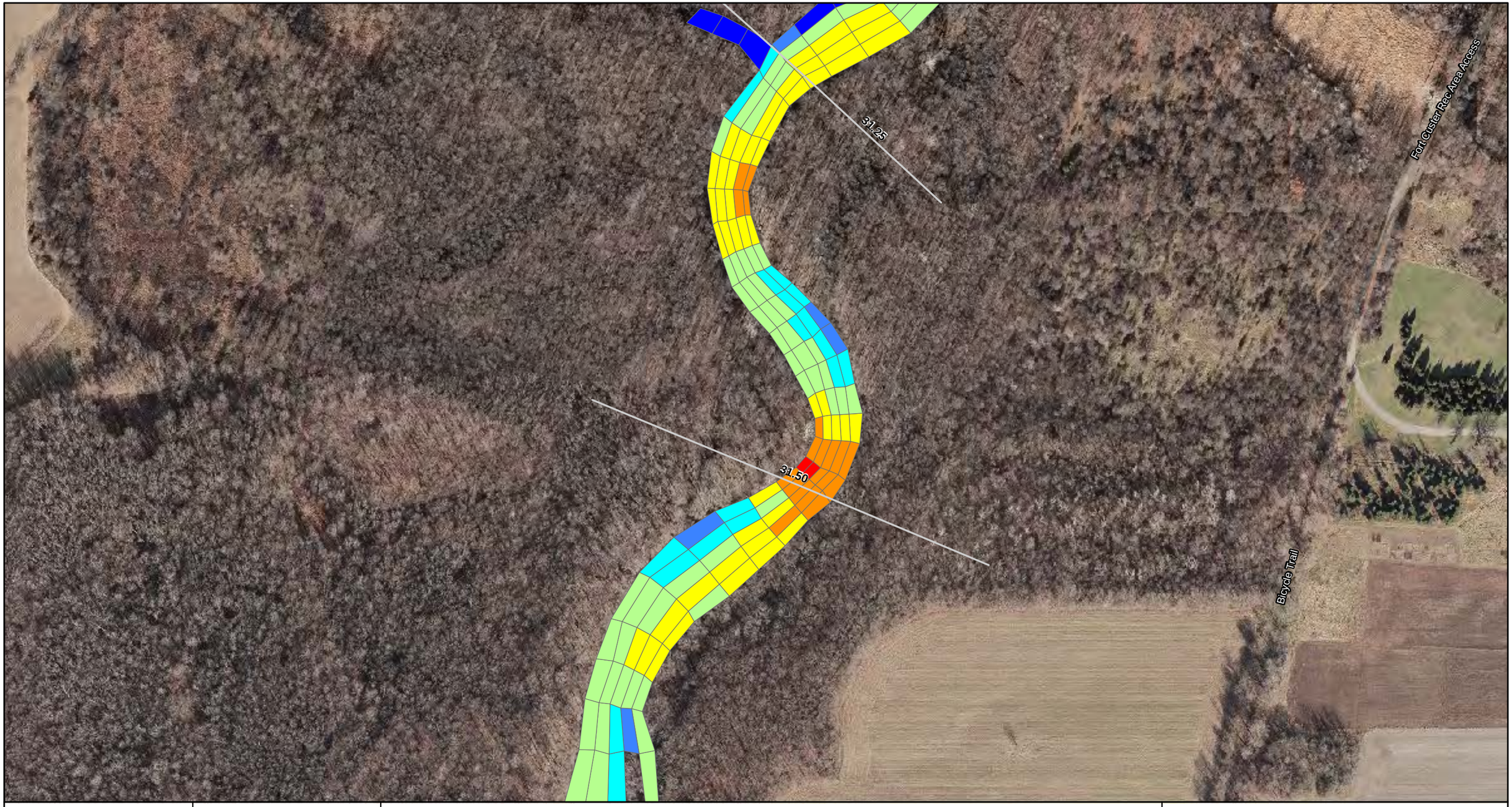
MP 30.75 - MP 31.25

SHEET 40 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

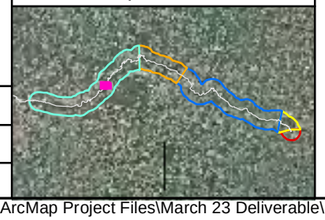
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

MP 31.25 - MP 31.70

SHEET 41 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

Aerial Photography Date: November 2011

31.75

32.00

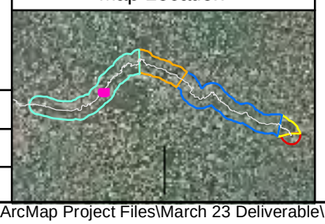
32.25

Bicycle Trail

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

MP 31.65 - MP 32.25

SHEET 42 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

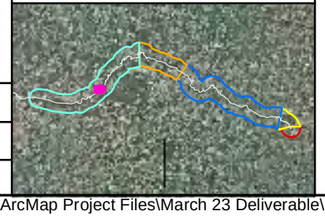
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

MP 32.25 - MP 33.10

SHEET 43 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

Aerial Photography Date: November 2011

33.00

33.25

33.50

33.75

Fort Custer Dr

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

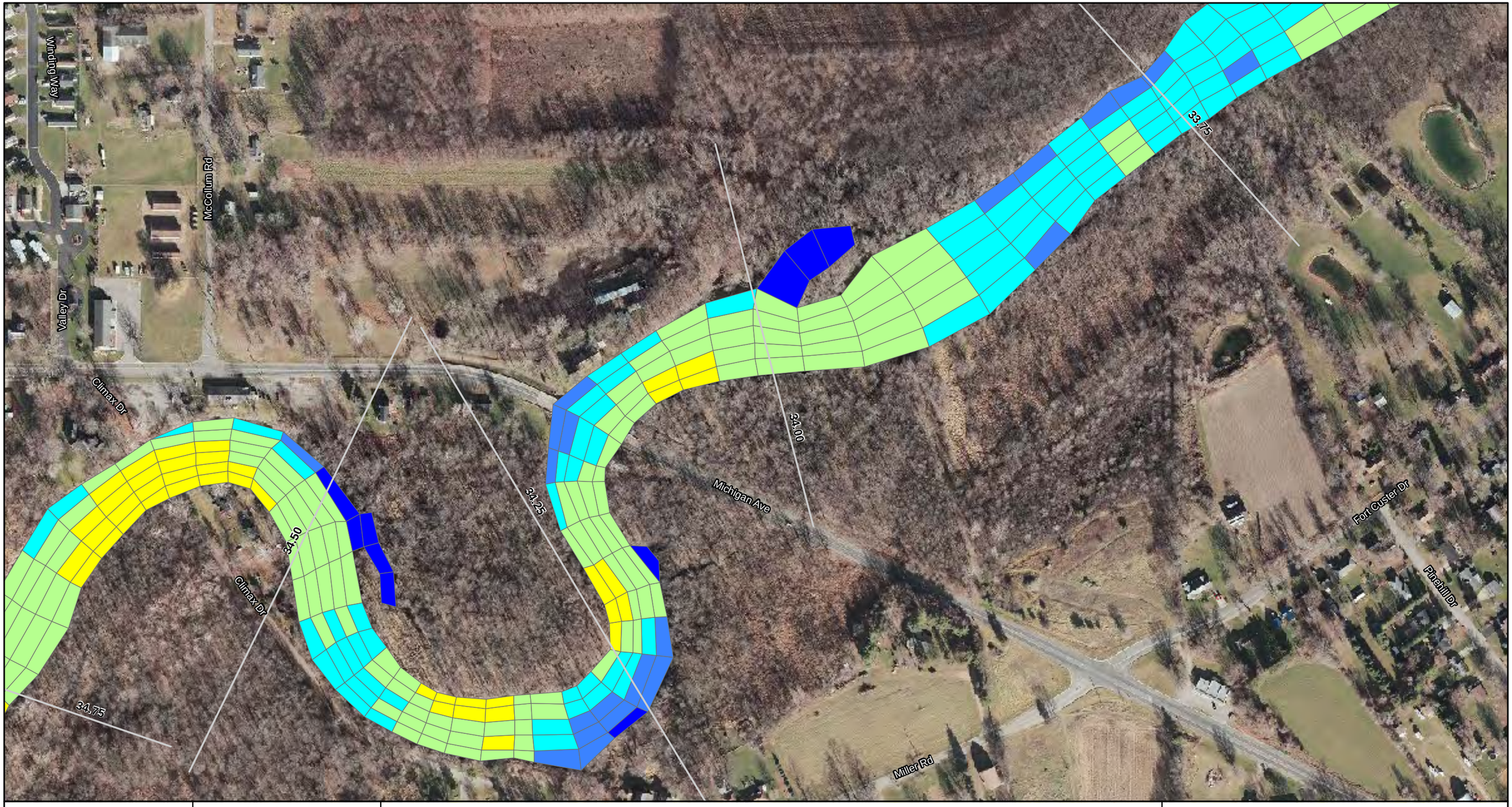
MP 33.10 - MP 33.70

SHEET 44 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

MP 33.70 - MP 34.70

SHEET 45 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

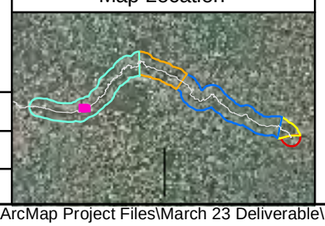
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

Aerial Photography Date: November 2011



Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

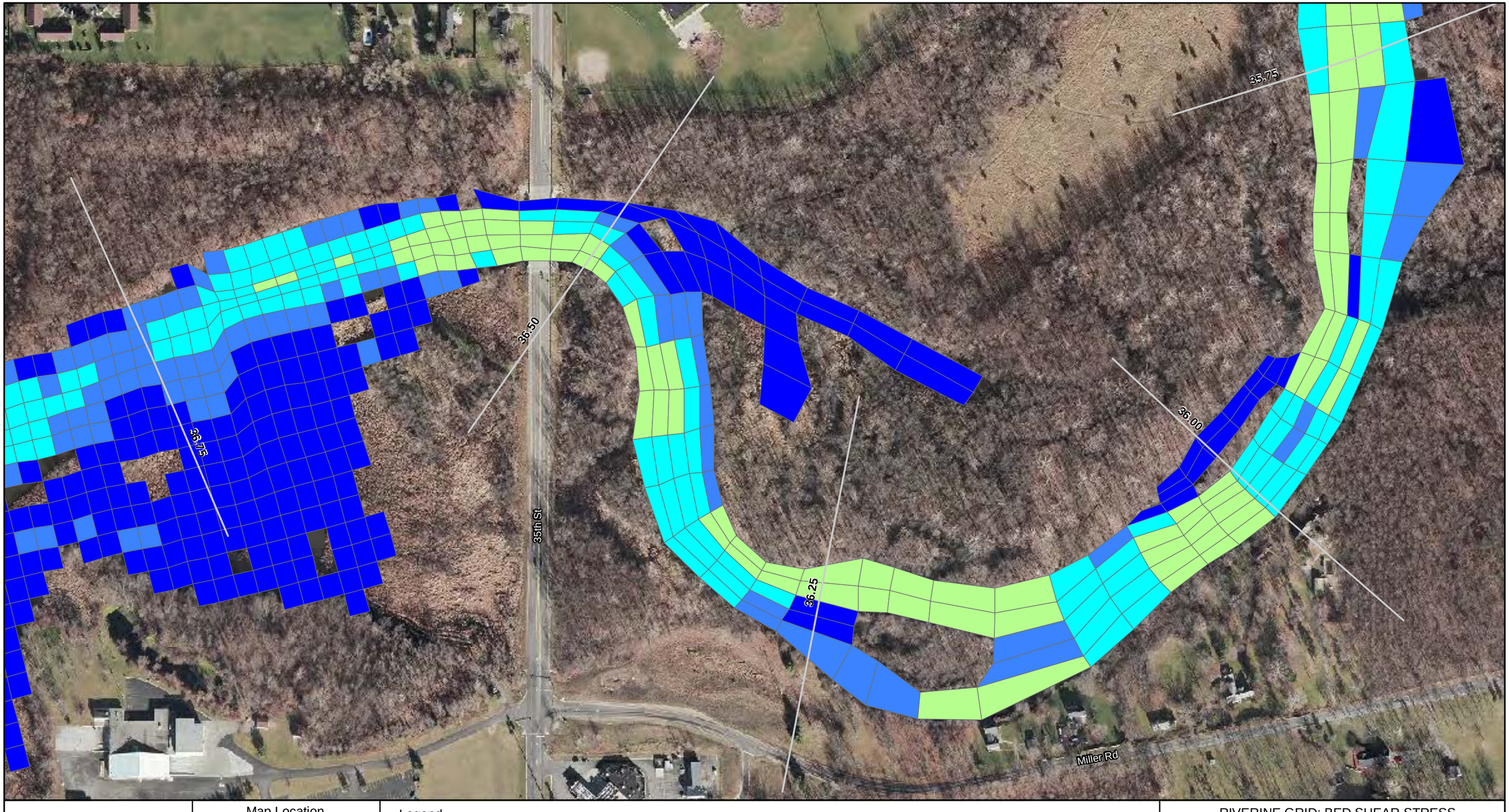
MP 34.70 - MP 35.75

SHEET 46 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

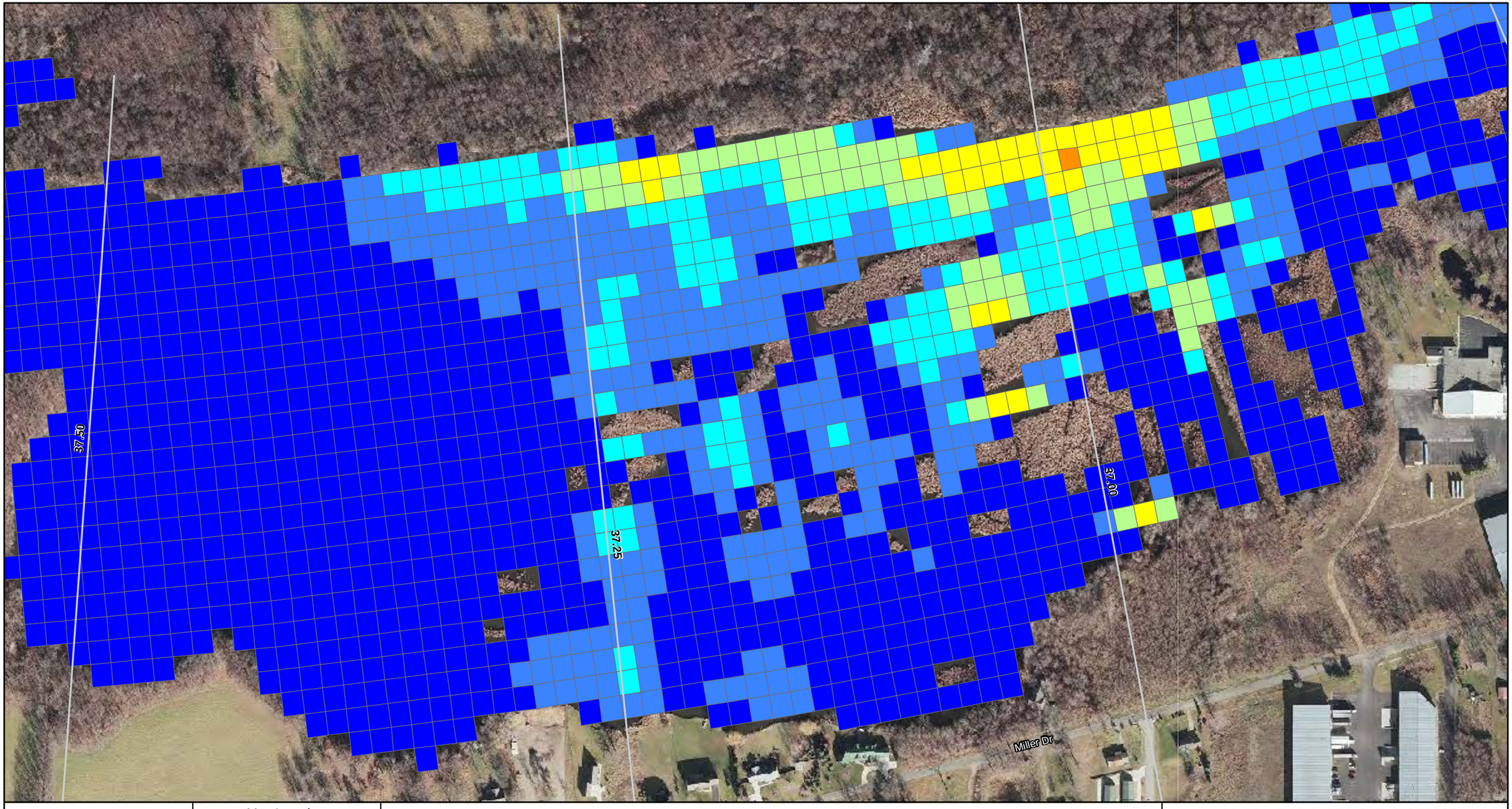
MP 35.75 - MP 36.80

SHEET 47 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

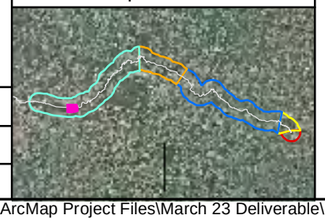
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011
- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

MP 36.80 - MP 37.55

SHEET 48 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

Aerial Photography Date: November 2011

38.25

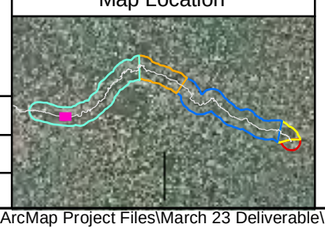
38.00

37.75

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals

cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

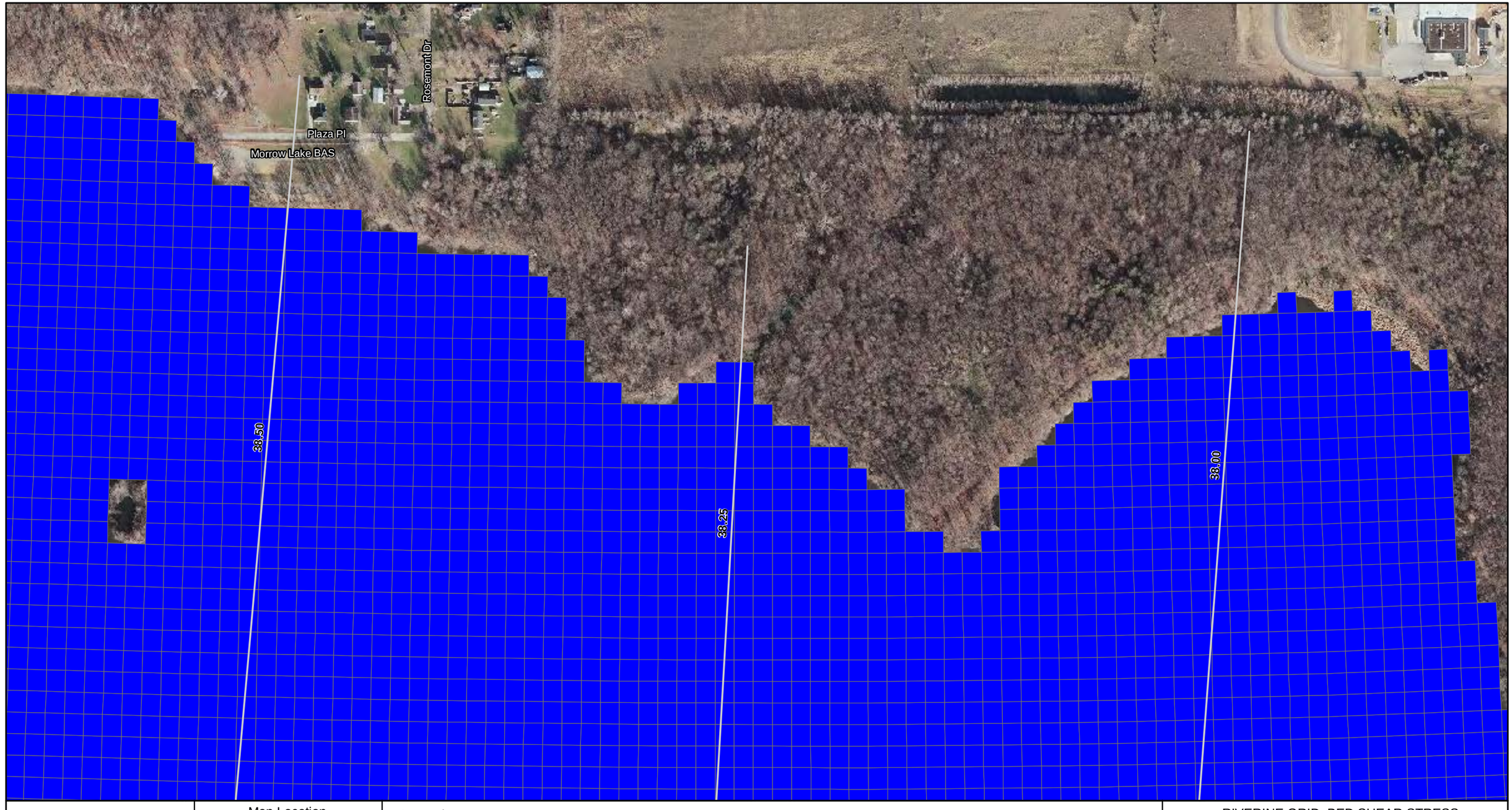
MP 37.55 - MP 38.30

SHEET 49 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

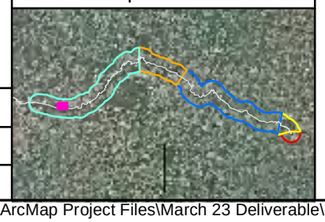
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals

cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

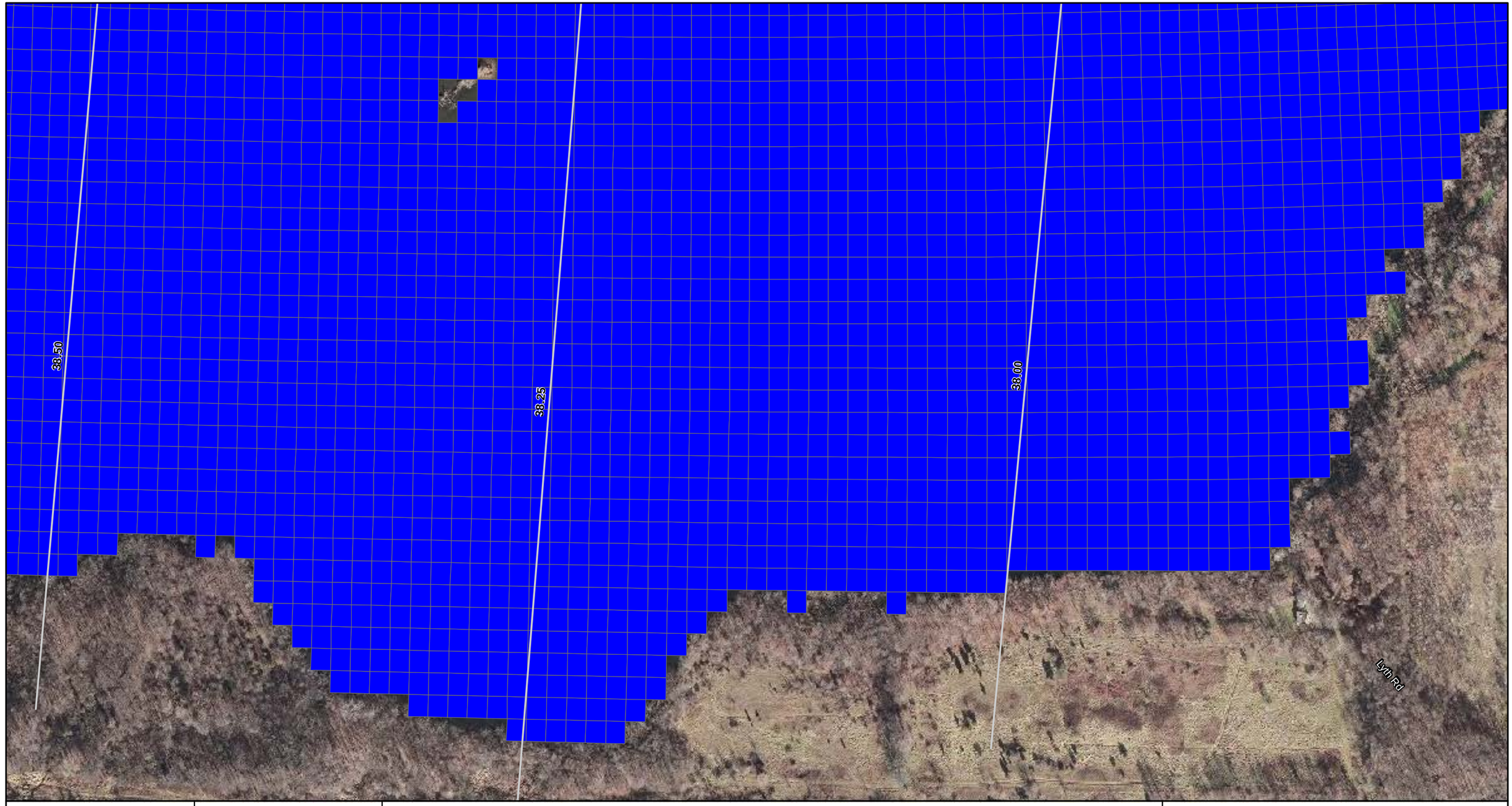
MP 37.80 - MP 38.60N

SHEET 50 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

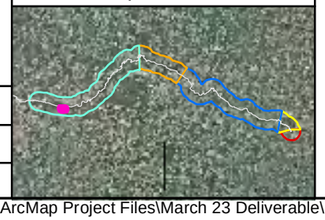
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011
- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

MP 37.80 - MP 38.60S

SHEET 51 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

39.00

38.75

38.50

38.25

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals

cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

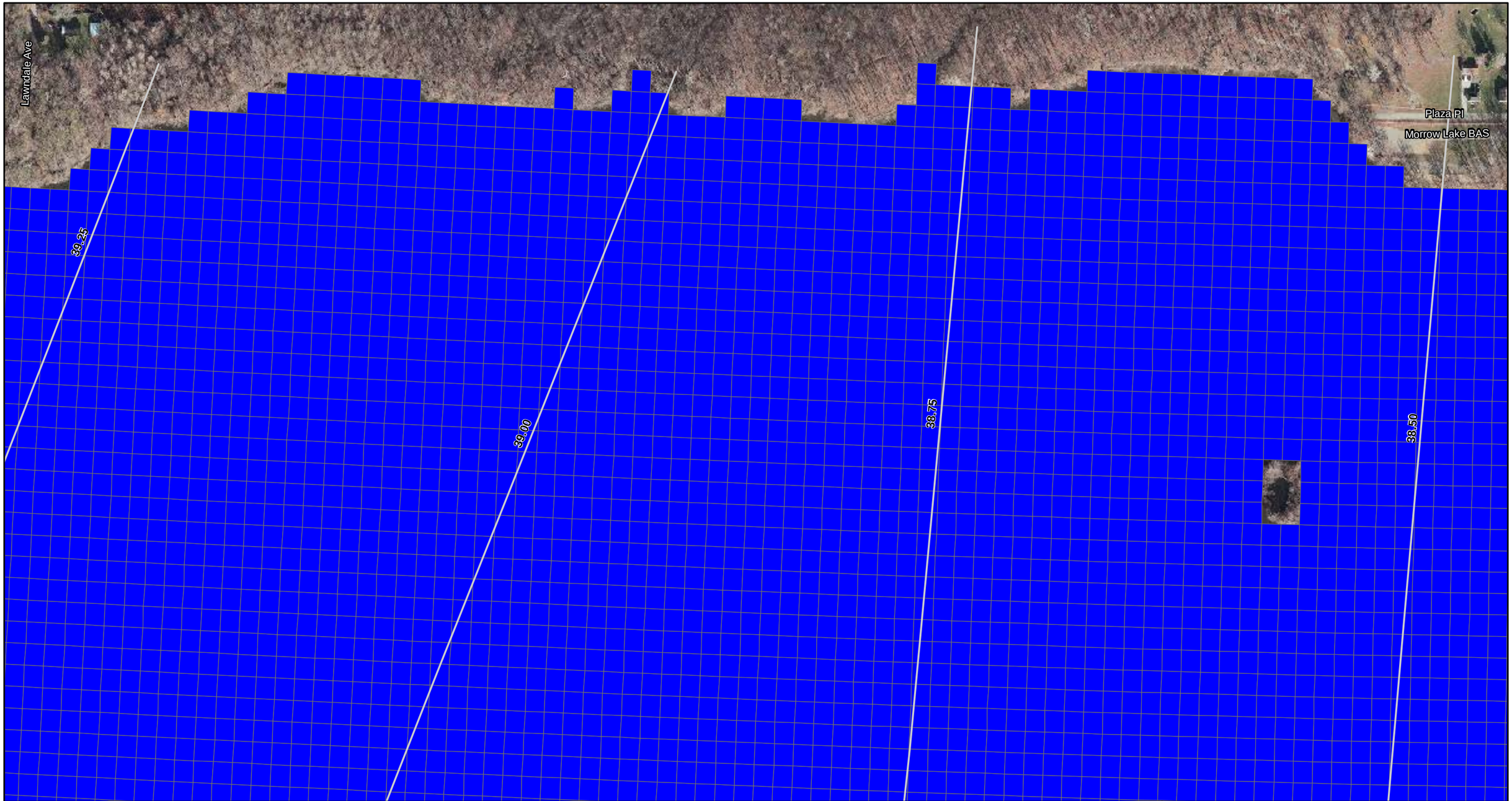
MP 38.25 - MP 39.00C

SHEET 52 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals

cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

MP 38.50 - MP 39.25N

SHEET 53 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

Aerial Photography Date: November 2011

39.25

39.00

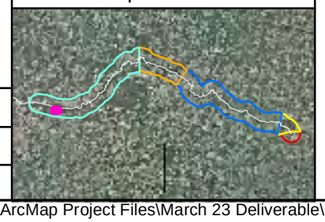
38.75

38.50

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

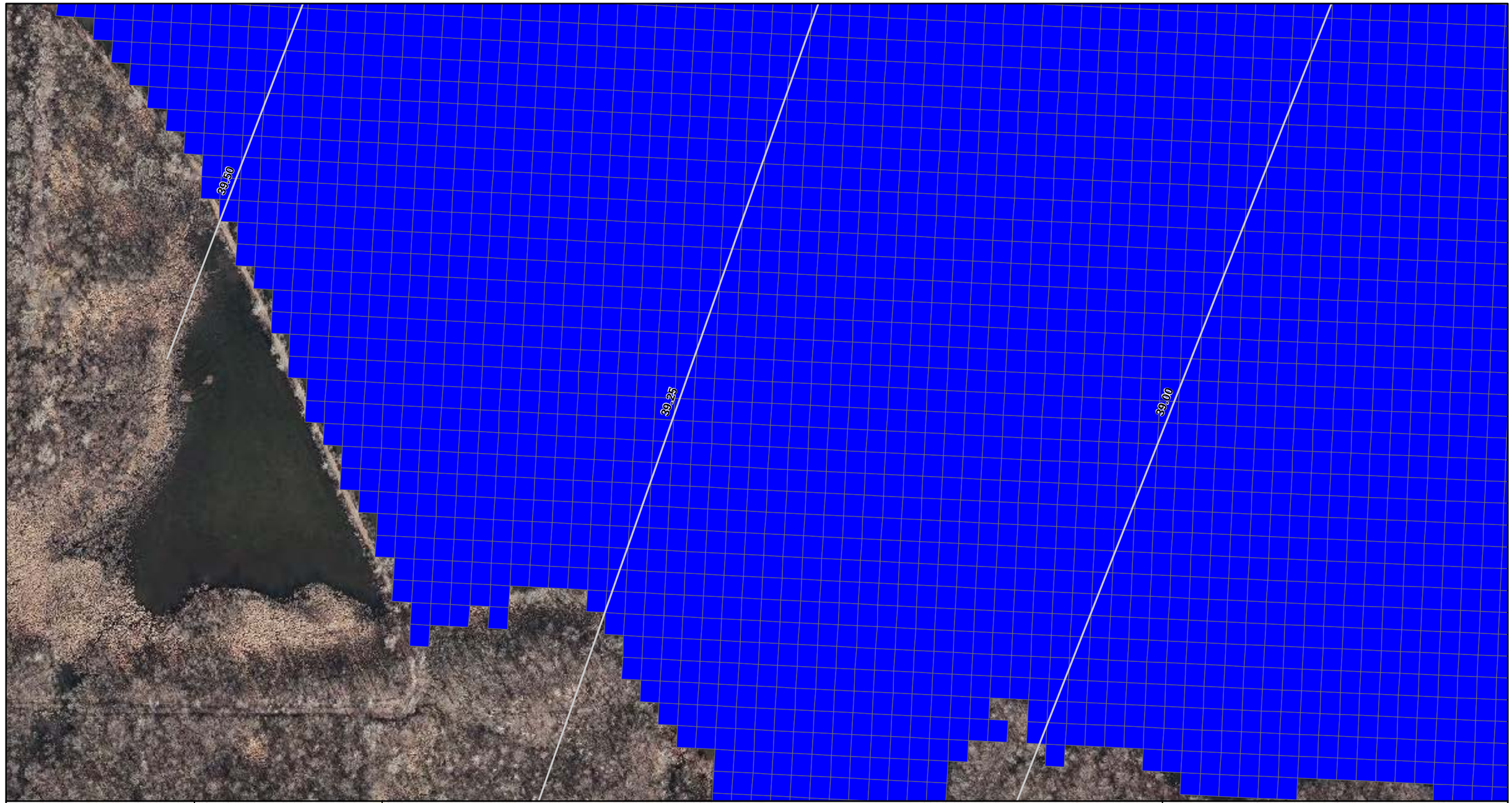
MP 38.50 - MP 39.25S

SHEET 54 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

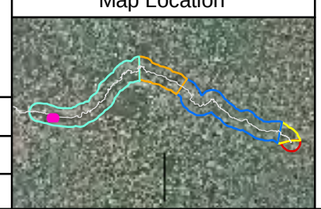
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals

cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

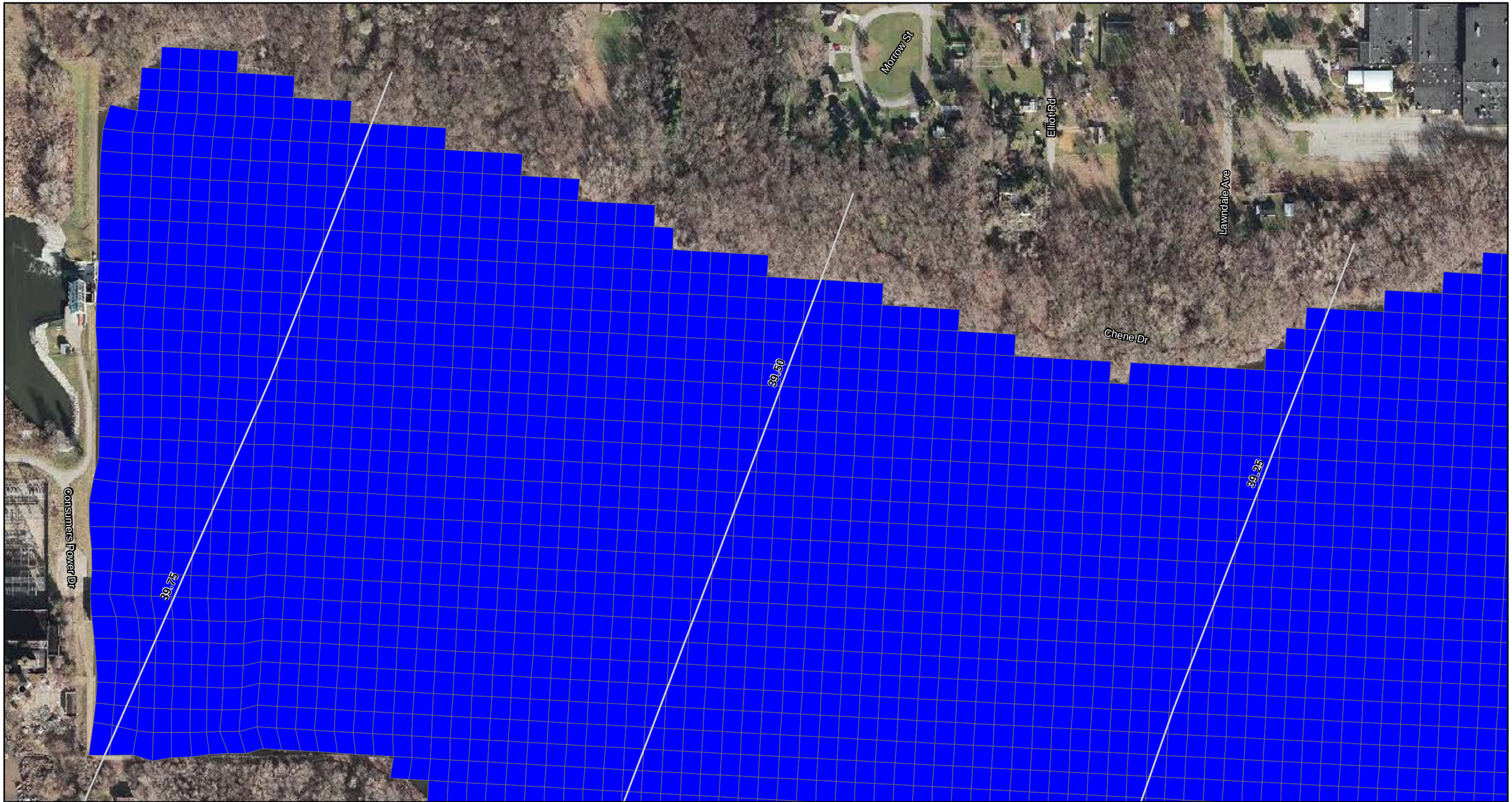
MP 38.90 - MP 39.60S

SHEET 55 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

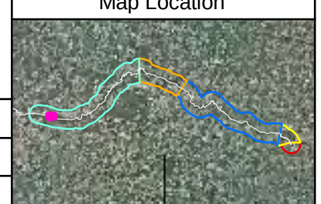
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 20, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals

cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,340 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 20, 2011

MP 39.15 - MP 39.85

SHEET 56 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May20_2011.mxd

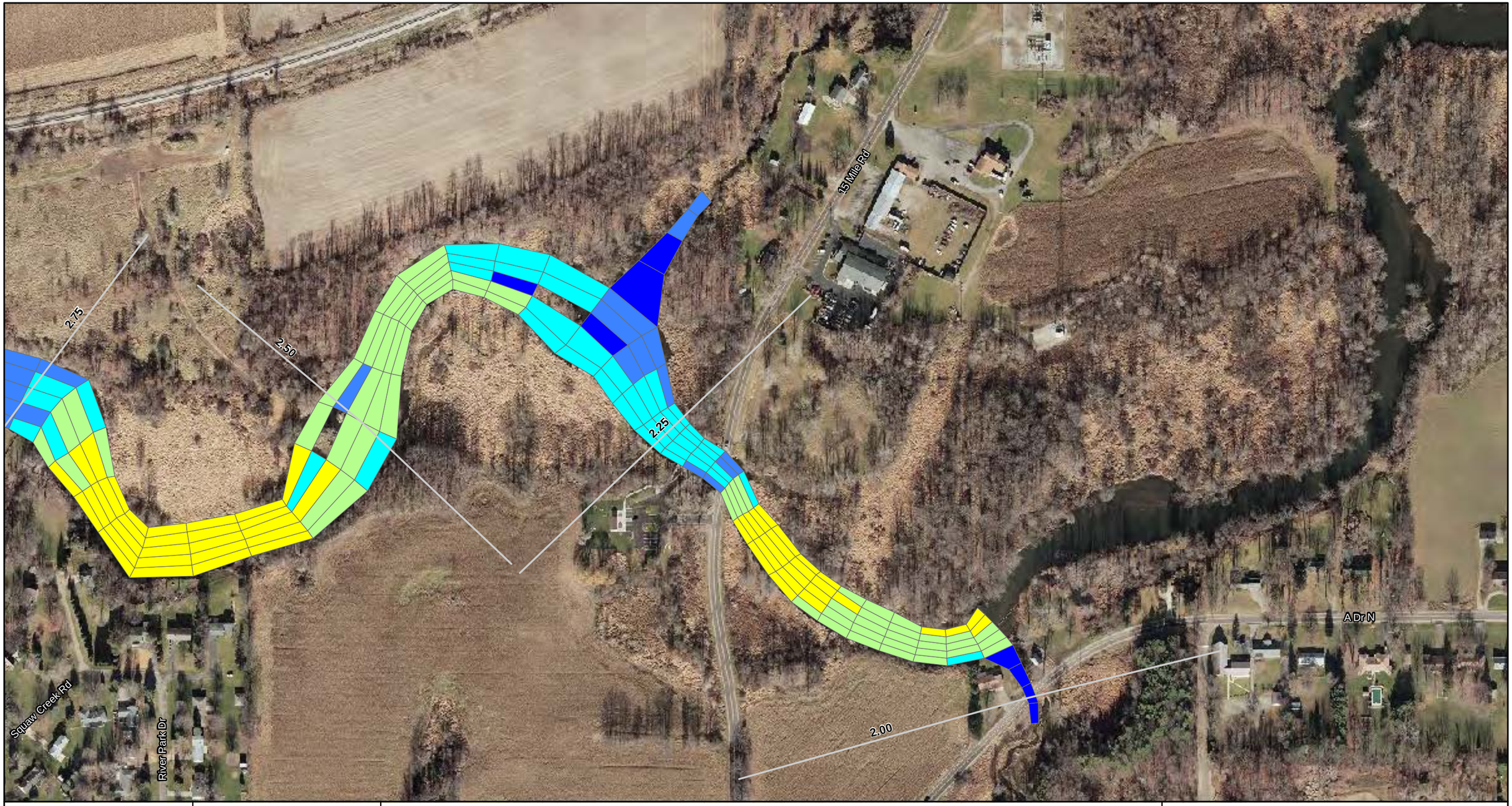
Aerial Photography Date: November 2011

Figure 5-11

Riverine Grid: Bed Shear Stress

May 21, 2011

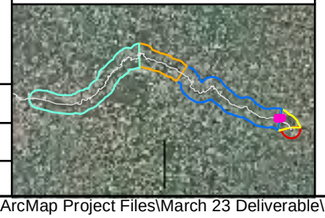
Sheets 1 through 56



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

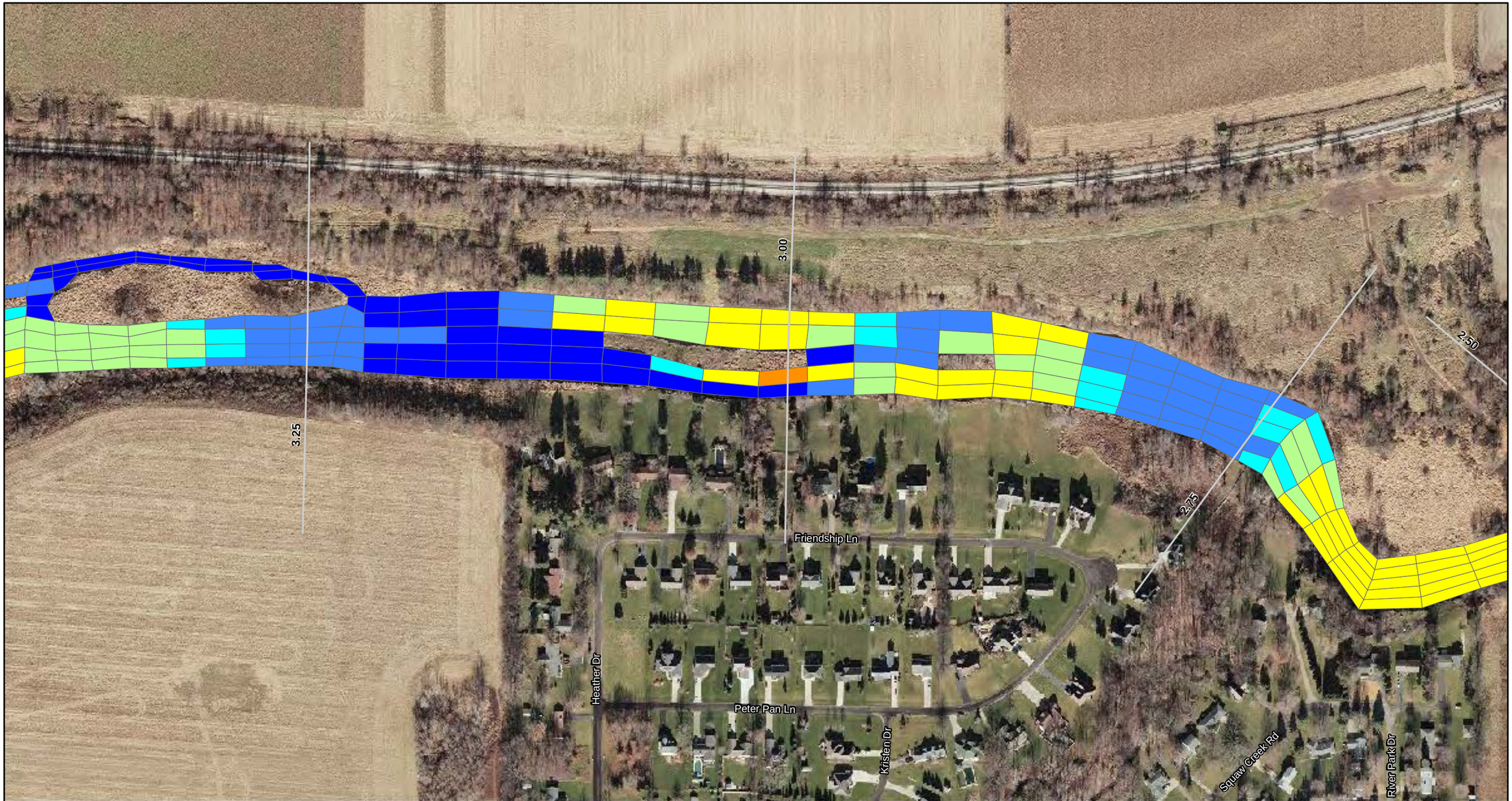
MP 01.95 - MP 02.75

SHEET 1 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May21_2011.mxd

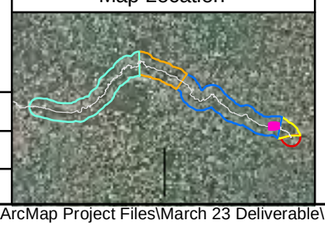
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

MP 02.60 - MP 03.40

SHEET 2 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May21_2011.mxd

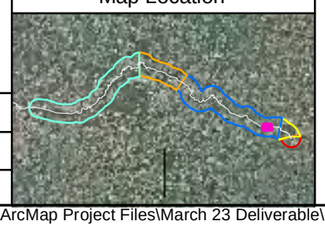
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

MP 03.40 - MP 04.20

SHEET 3 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011
- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

MP 04.15 - MP 05.00

SHEET 4 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011
- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

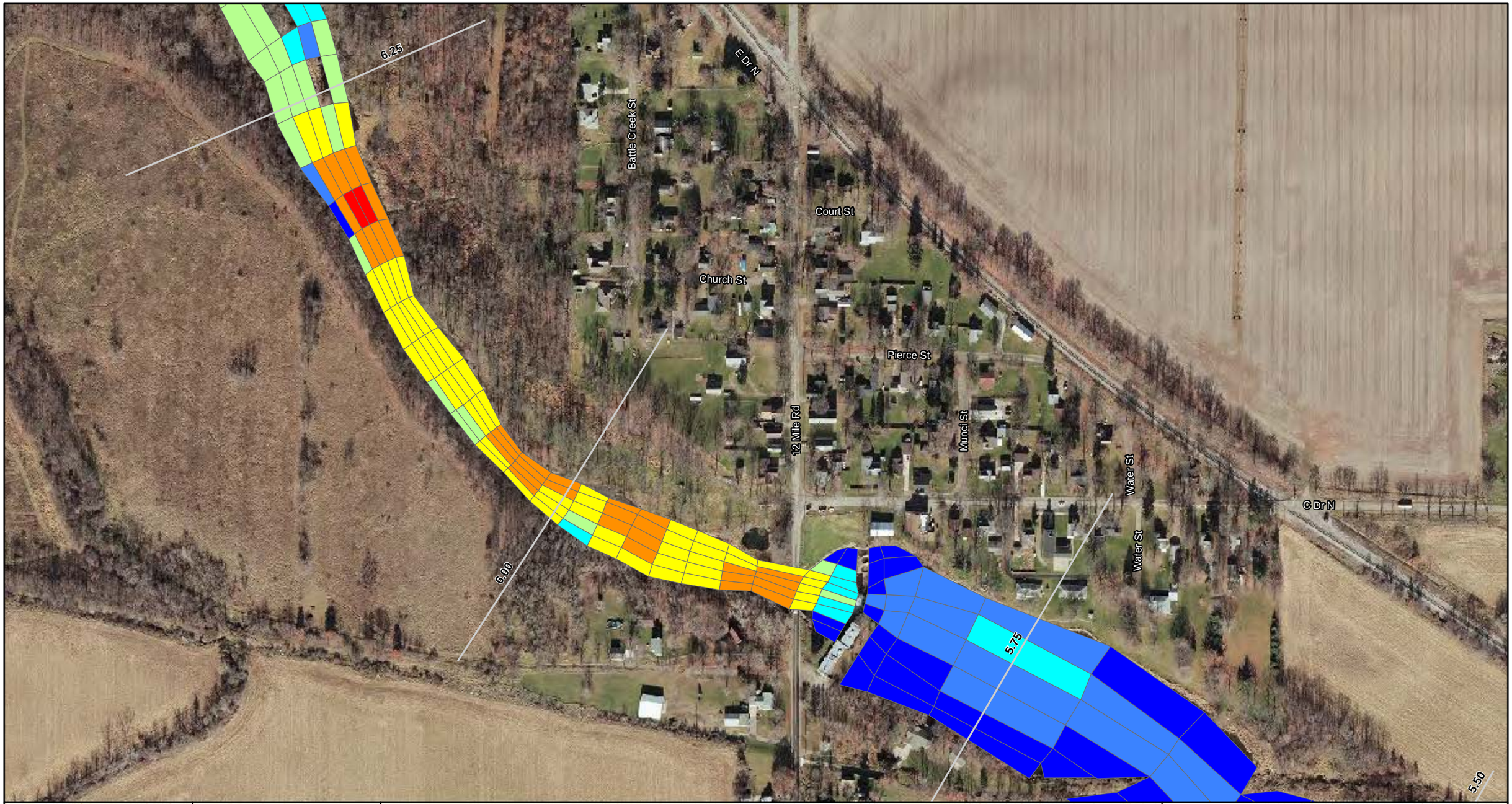
MP 04.90 - MP 05.65

SHEET 5 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May21_2011.mxd

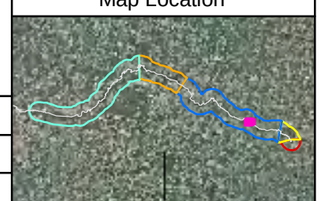
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

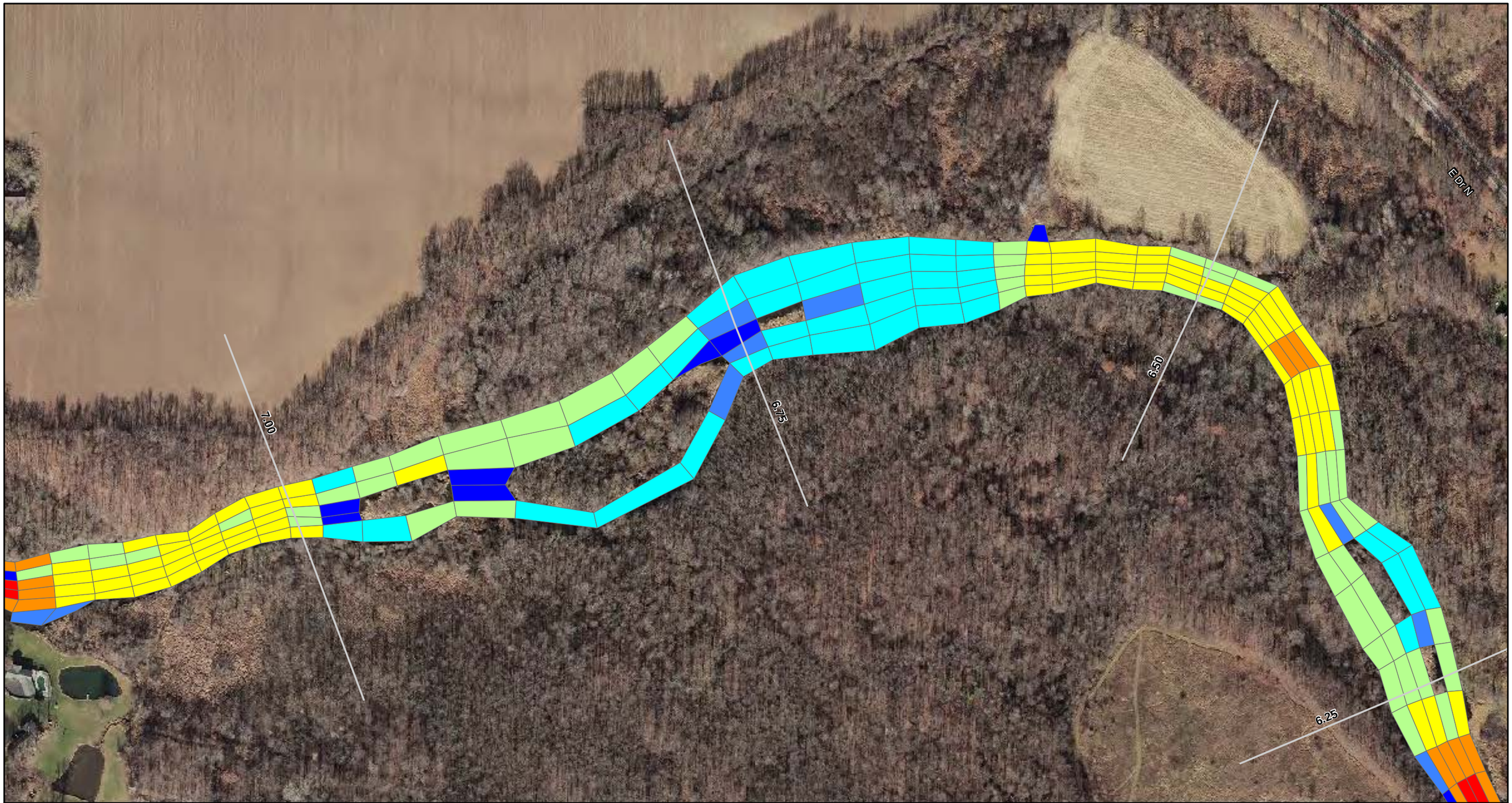
MP 05.65 - MP 06.30

SHEET 6 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

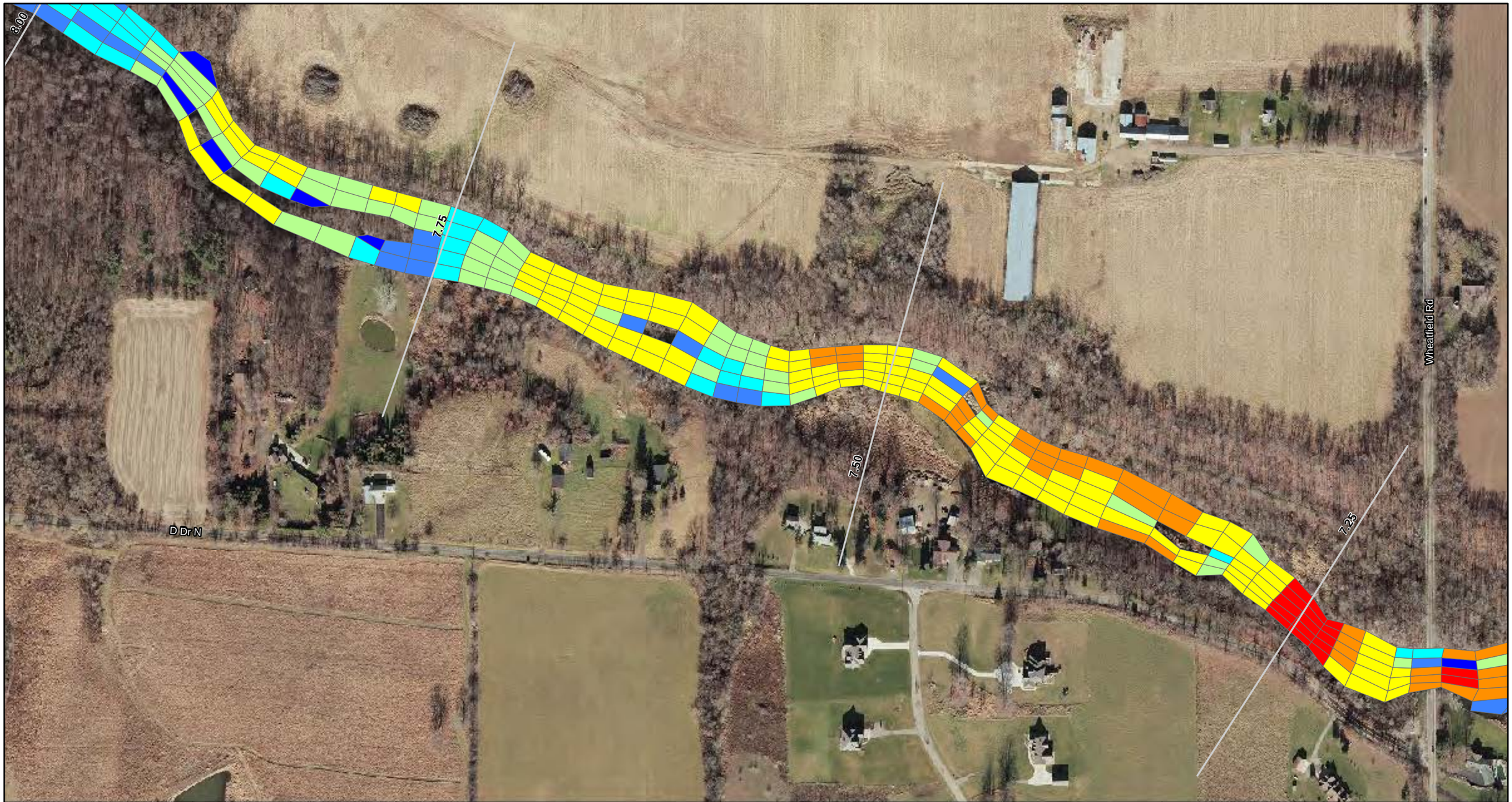
MP 06.20 - MP 07.15

SHEET 7 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

MP 07.15 - MP 07.95

SHEET 8 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

8.75

8.50

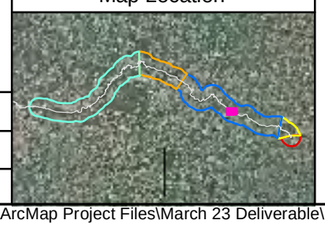
8.25

8.00

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

MP 07.90 - MP 08.75

SHEET 9 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

MP 08.70 - MP 09.30

SHEET 10 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals

cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

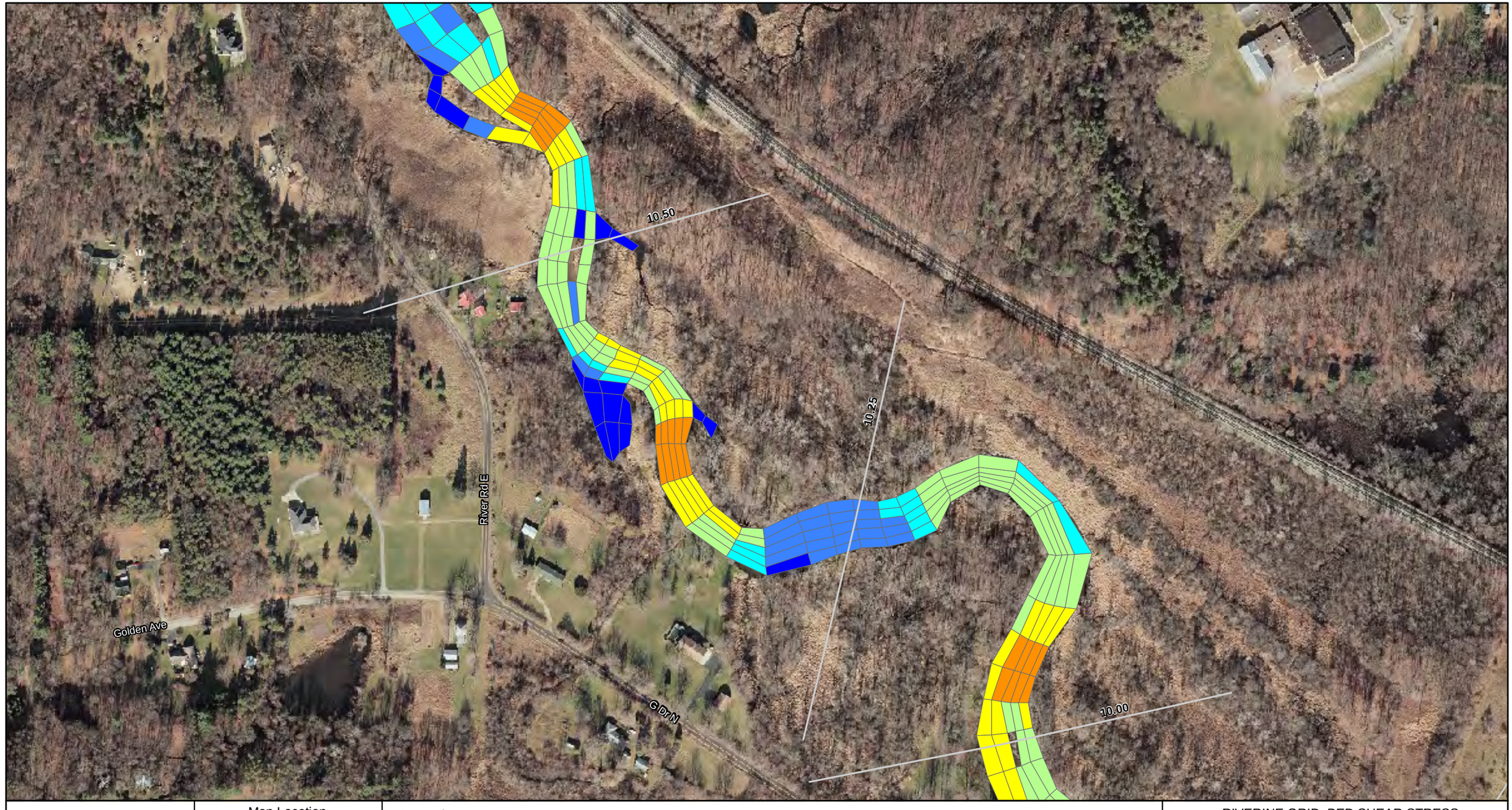
MP 09.25 - MP 10.05

SHEET 11 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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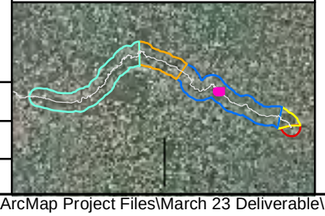
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

MP 10.00 - MP 10.65

SHEET 12 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

11.25

11.00

10.75

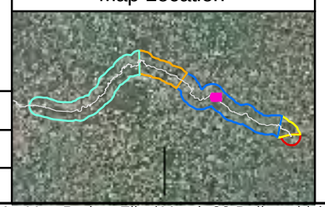
River Rd E

Kimball Pines Park Rd

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

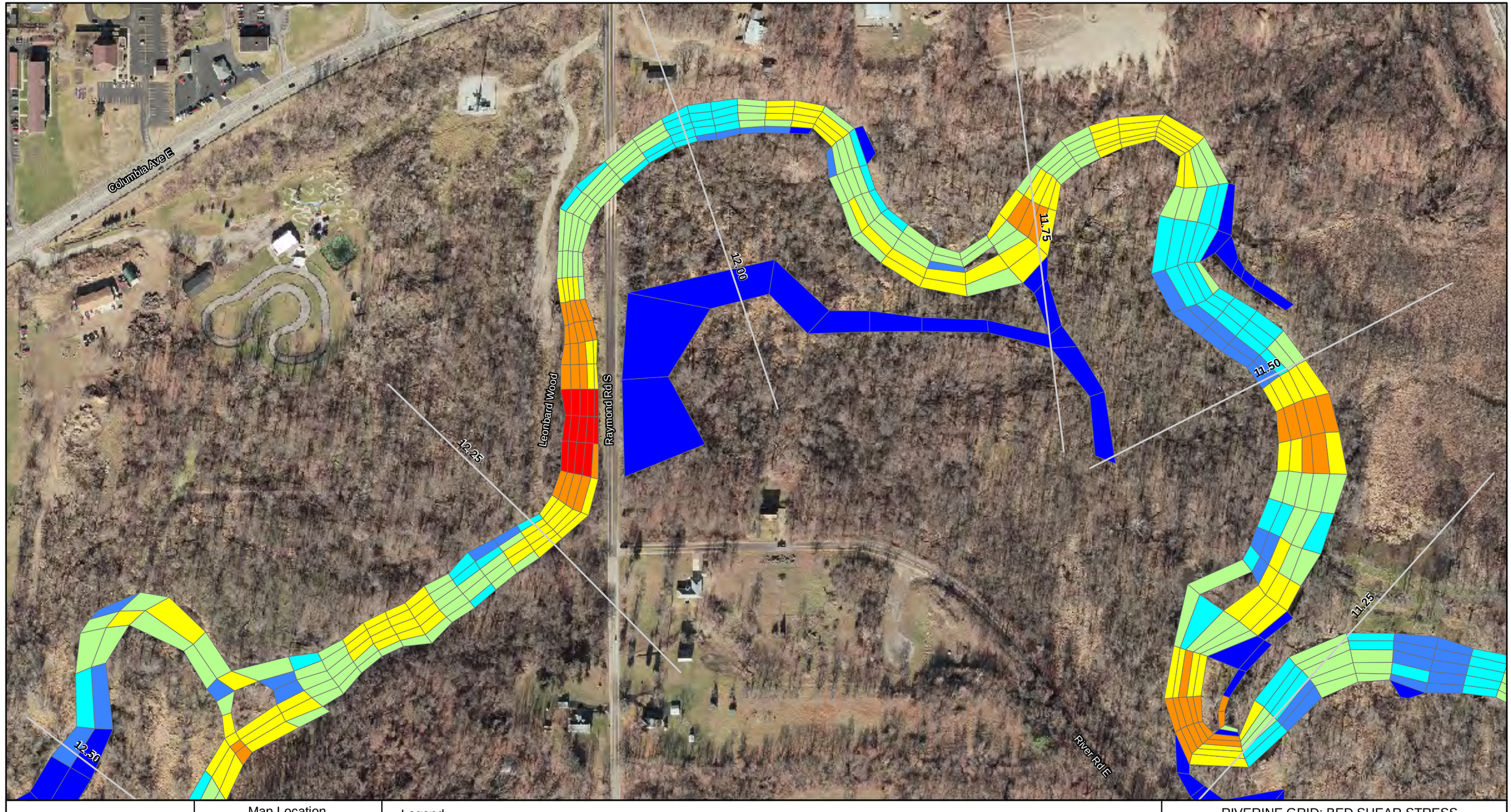
MP 10.60 - MP 11.40

SHEET 13 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

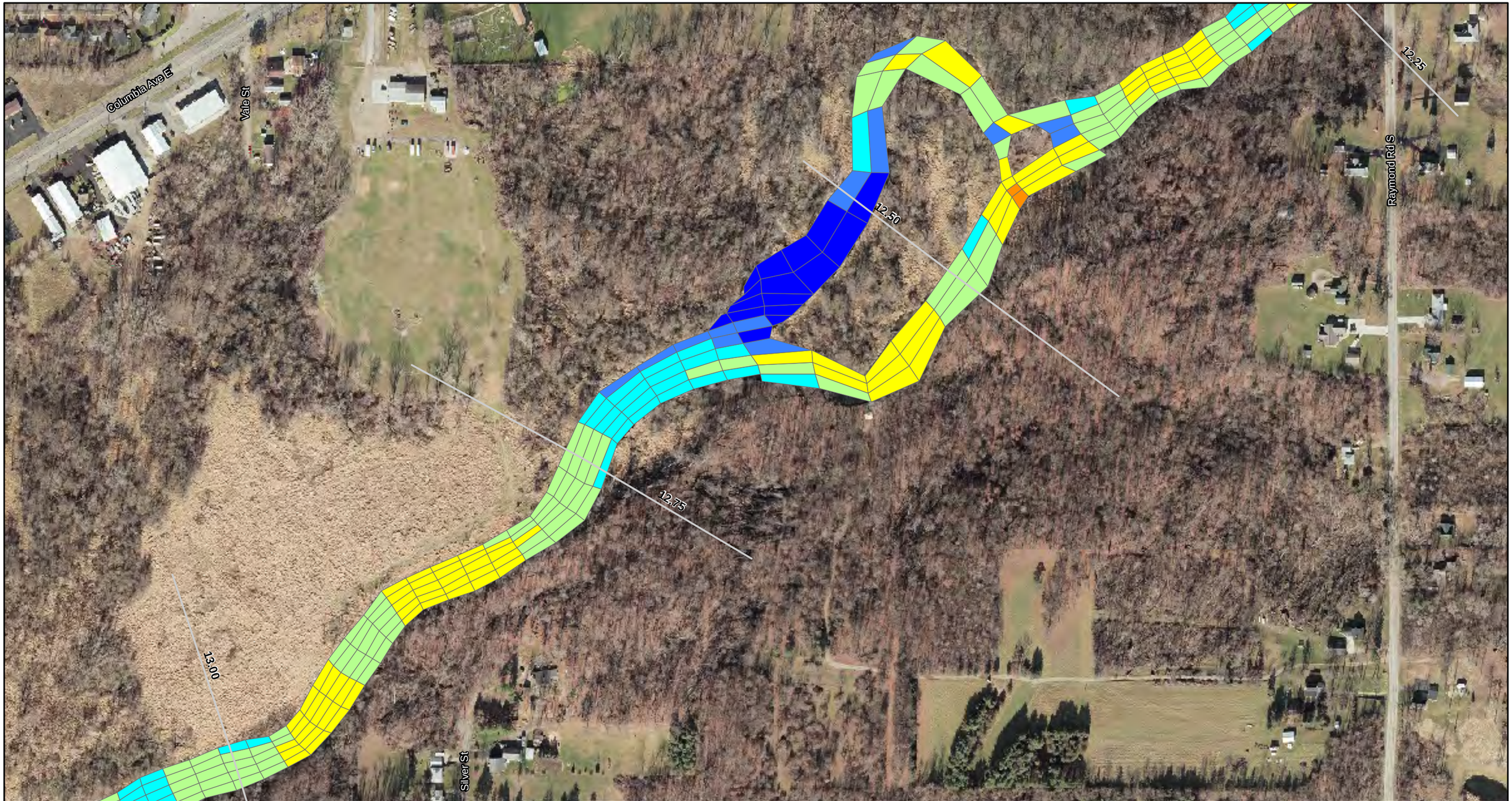
MP 11.10 - MP 12.45

SHEET 14 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

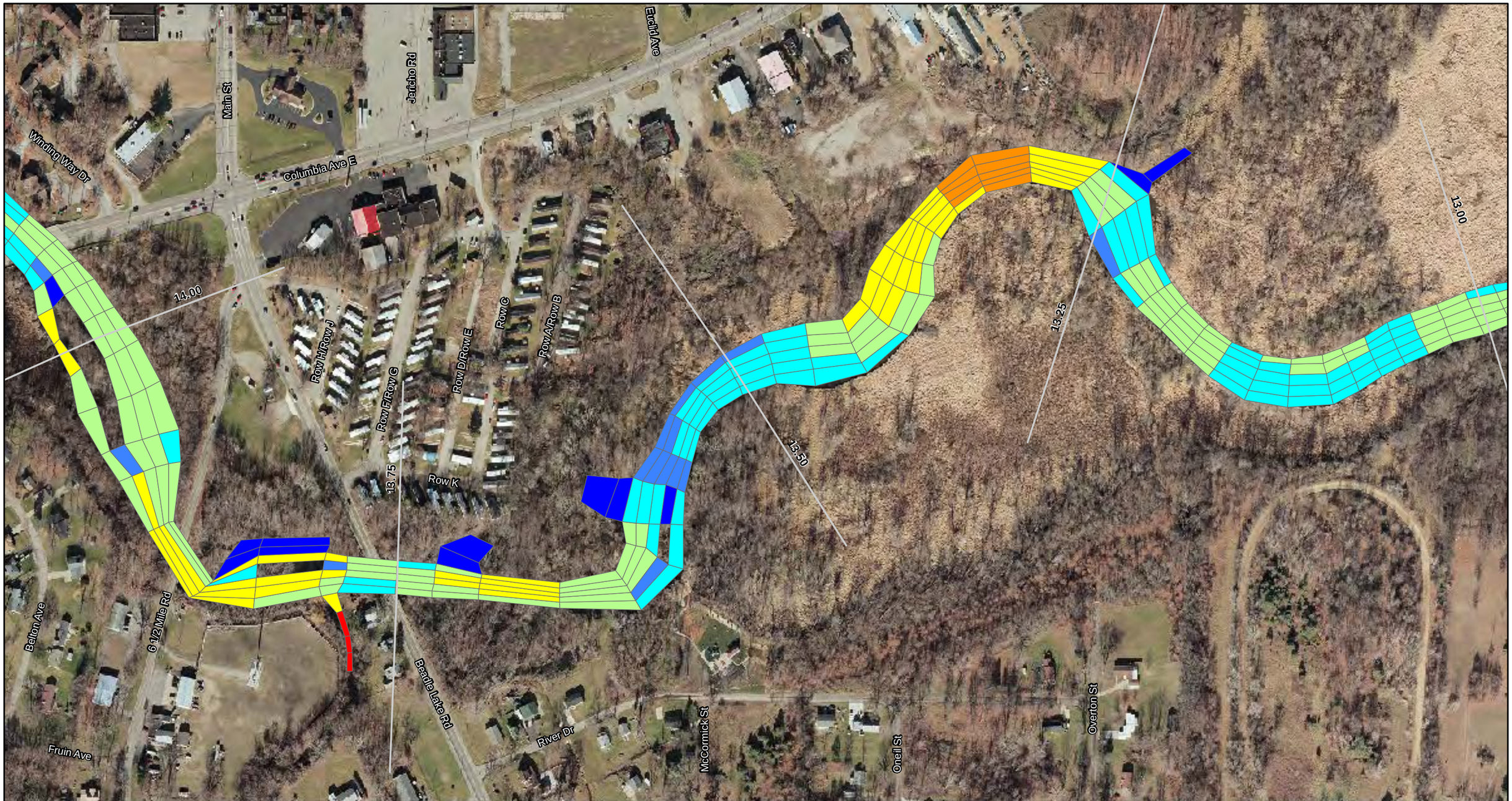
MP 12.30 - MP 13.05

SHEET 15 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011
- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

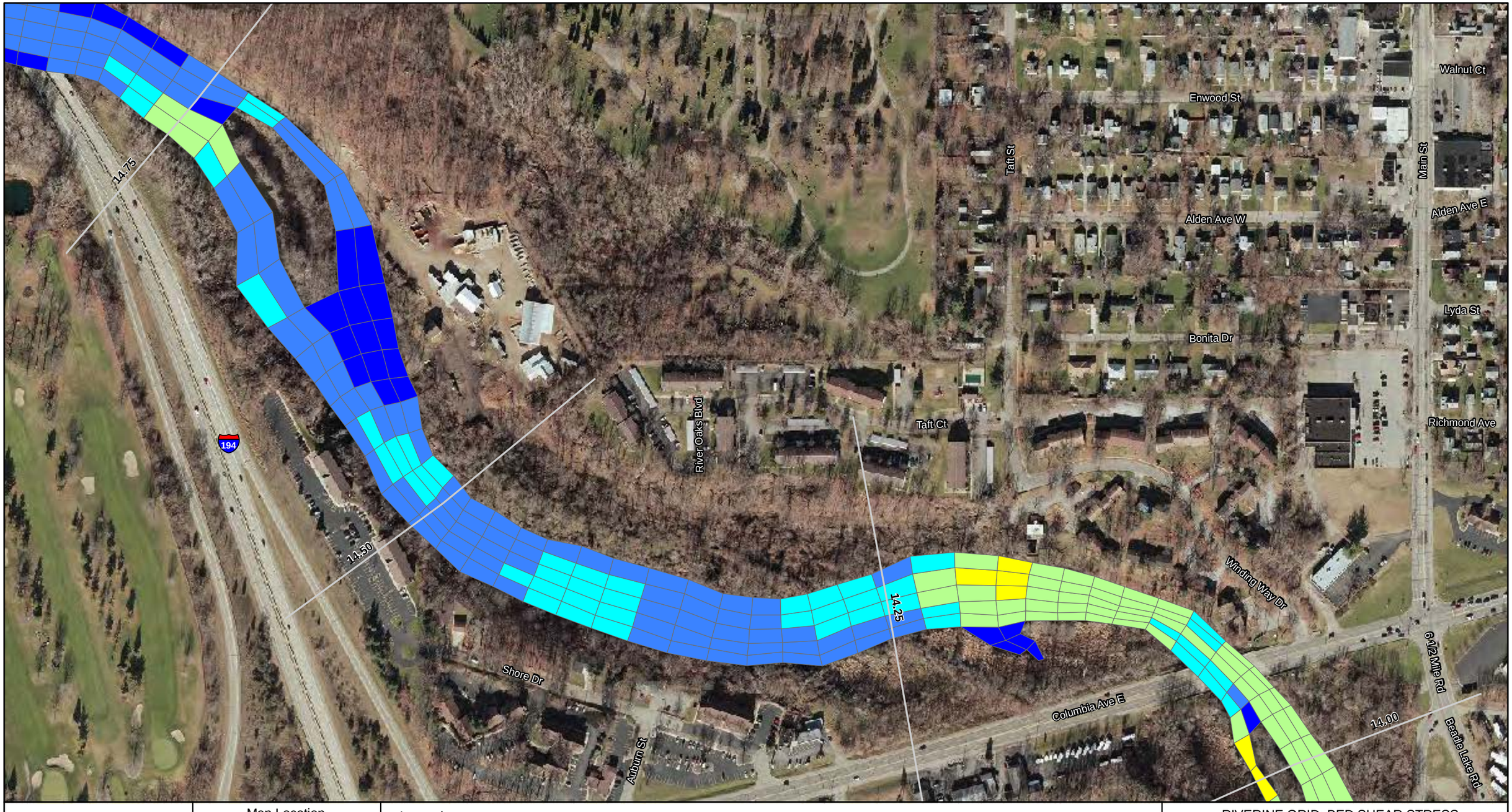
MP 13.00 - MP 14.10

SHEET 16 OF 56

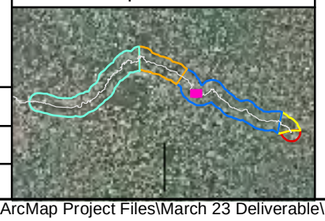
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



Map Location



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

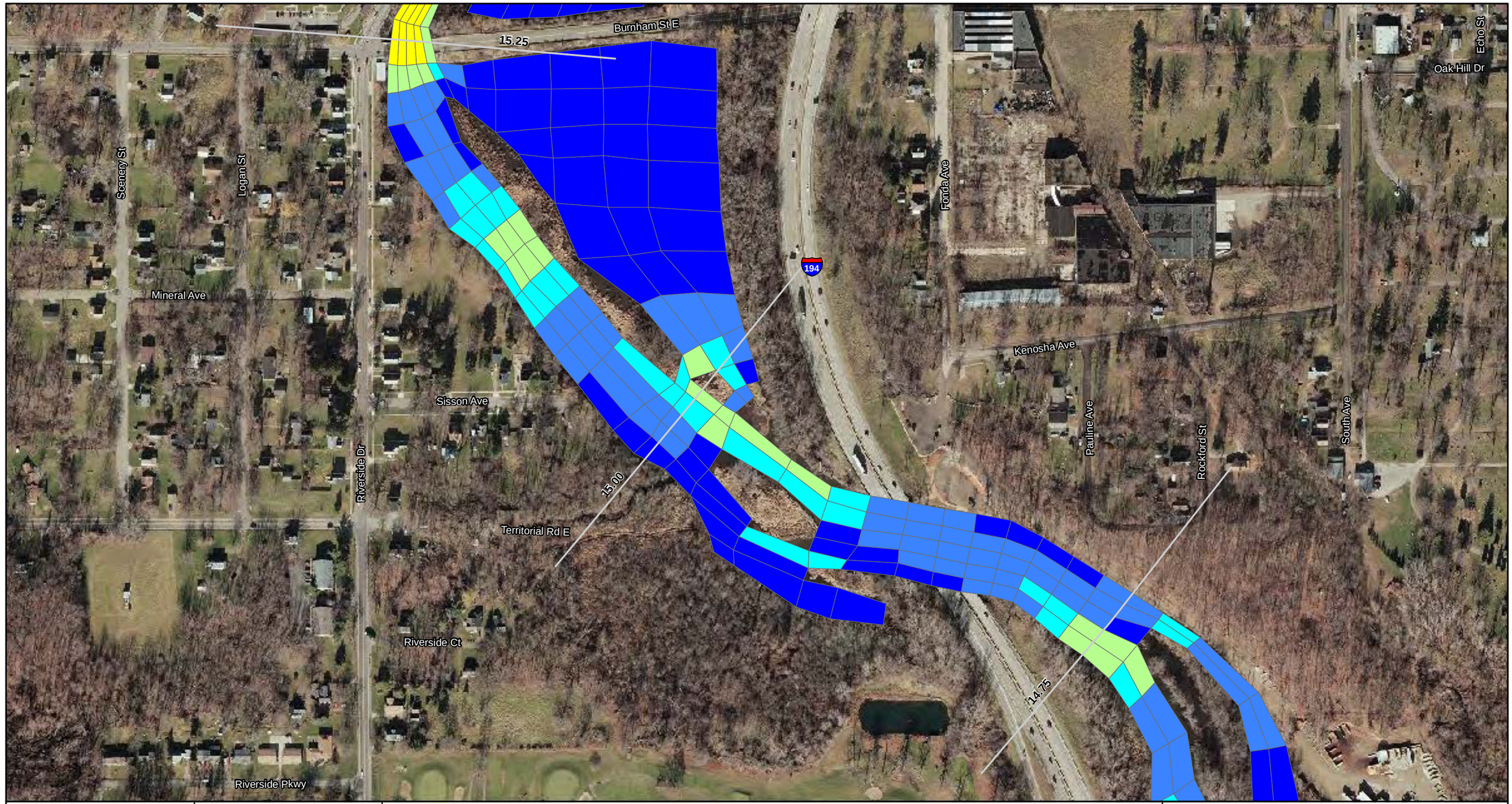
MP 14.00 - MP 14.85

SHEET 17 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May21_2011.mxd

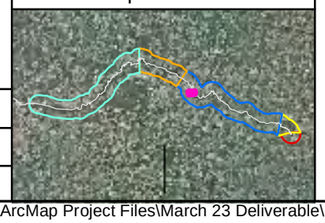
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

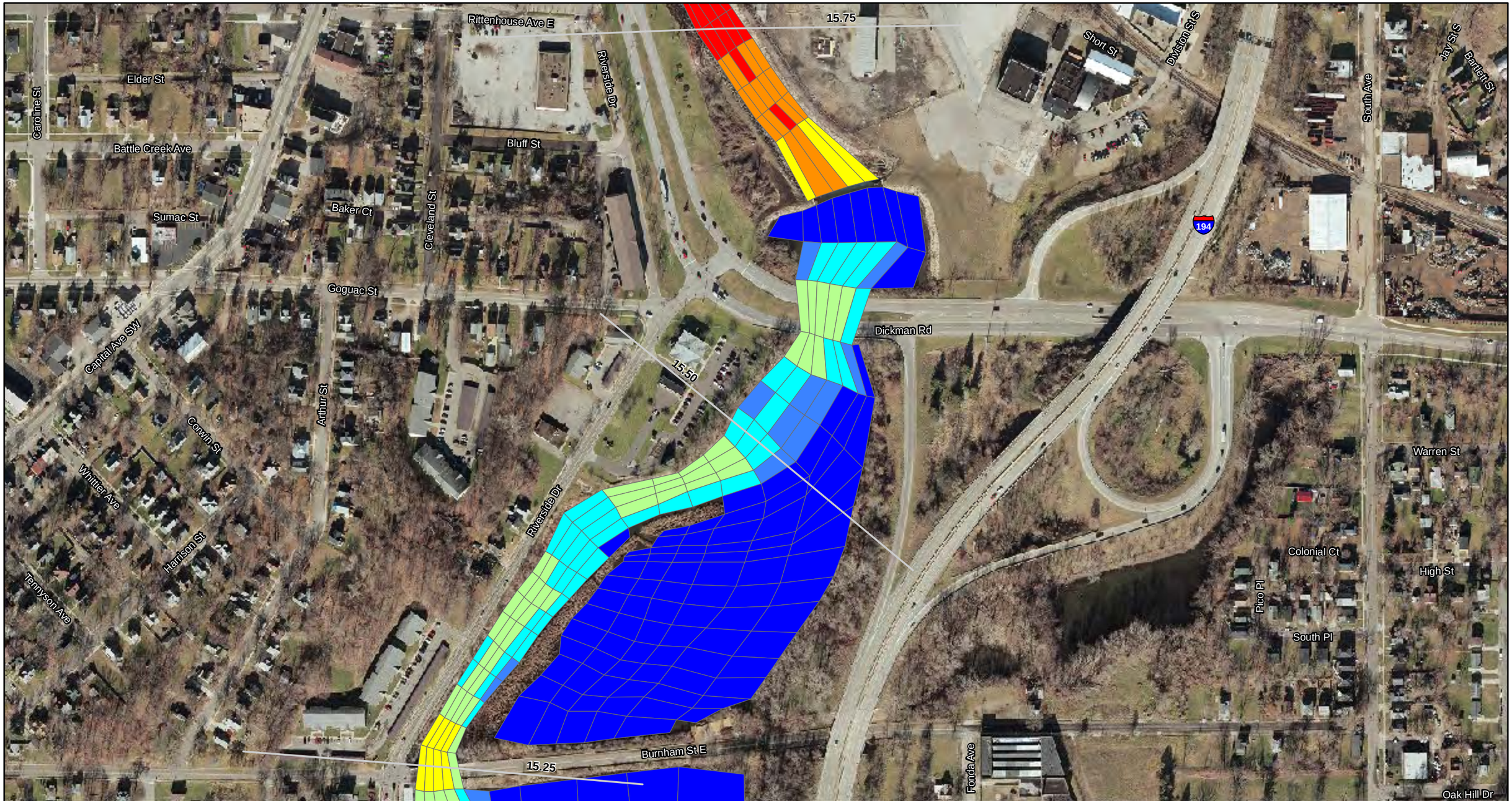
MP 14.65 - MP 15.25

SHEET 18 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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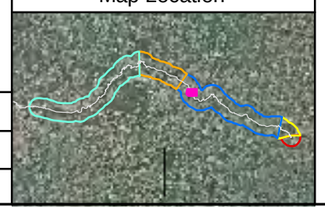
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

MP 15.25 - MP 15.75

SHEET 19 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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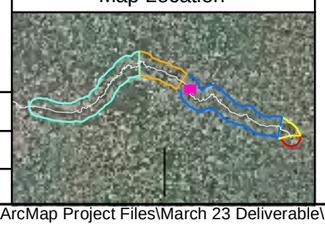
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

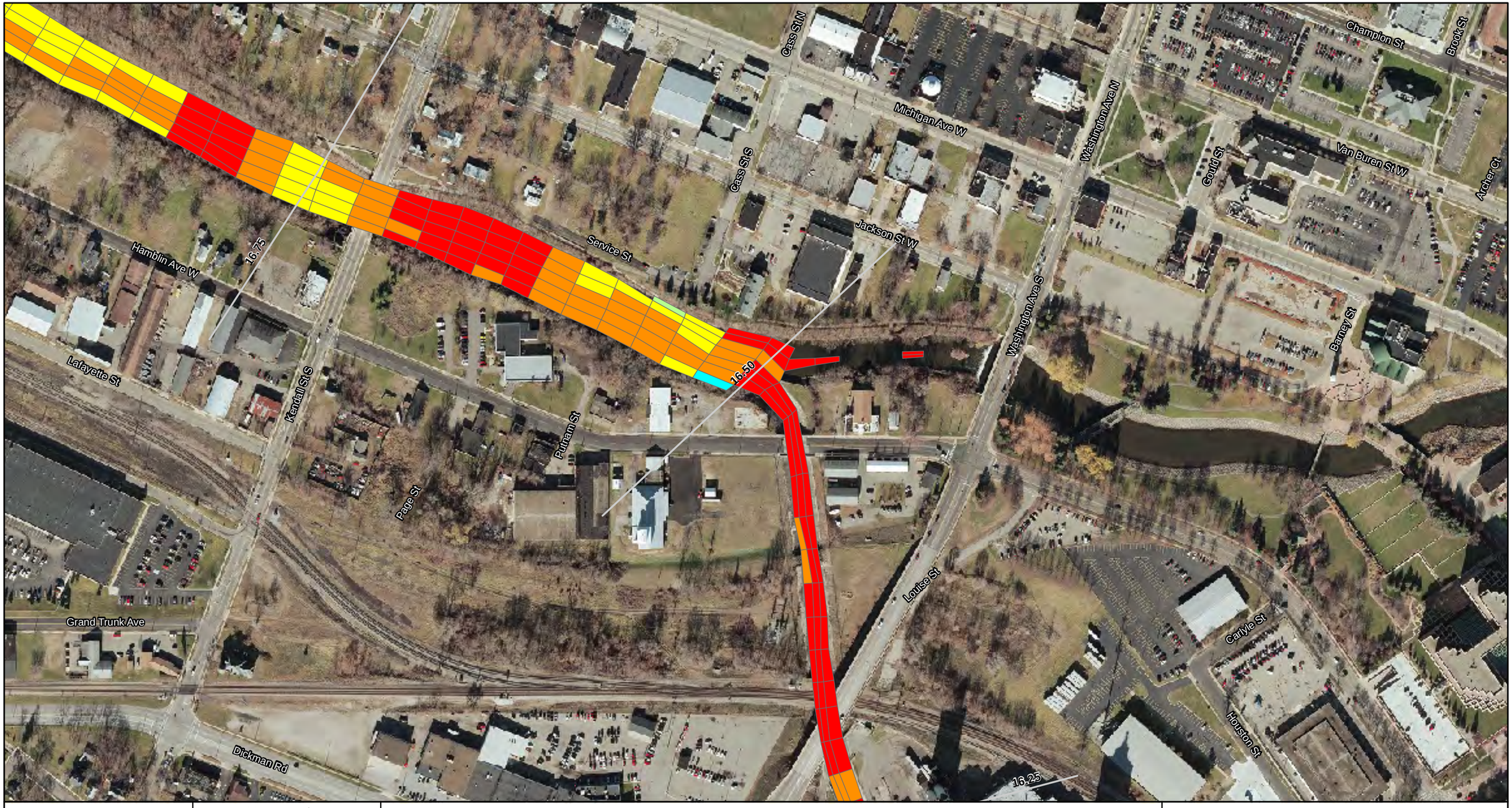
MP 15.75 - MP 16.30

SHEET 20 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May21_2011.mxd

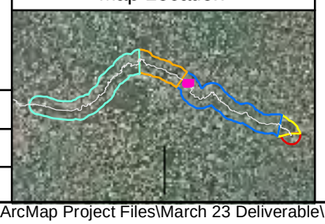
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

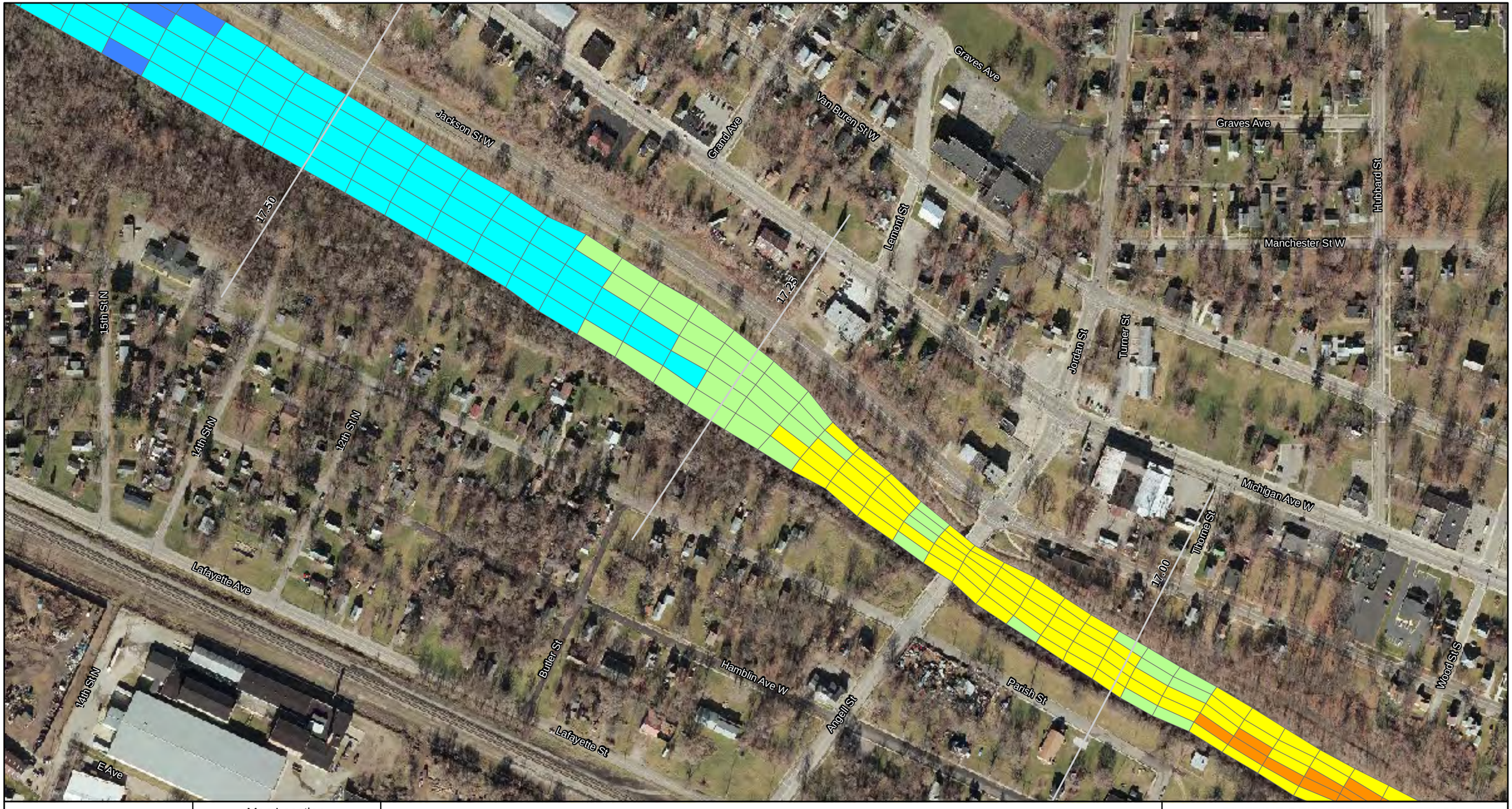
MP 16.30 - MP 16.95

SHEET 21 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May21_2011.mxd

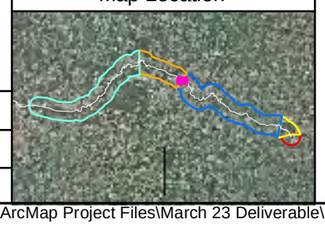
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
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- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals

cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

MP 16.85 - MP 17.60

SHEET 22 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May21_2011.mxd

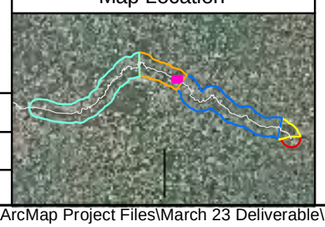
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011
- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

MP 17.60 - MP 18.40

SHEET 23 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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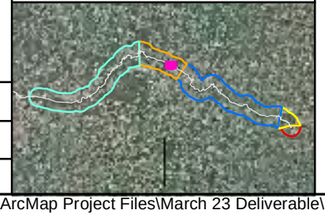
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

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- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

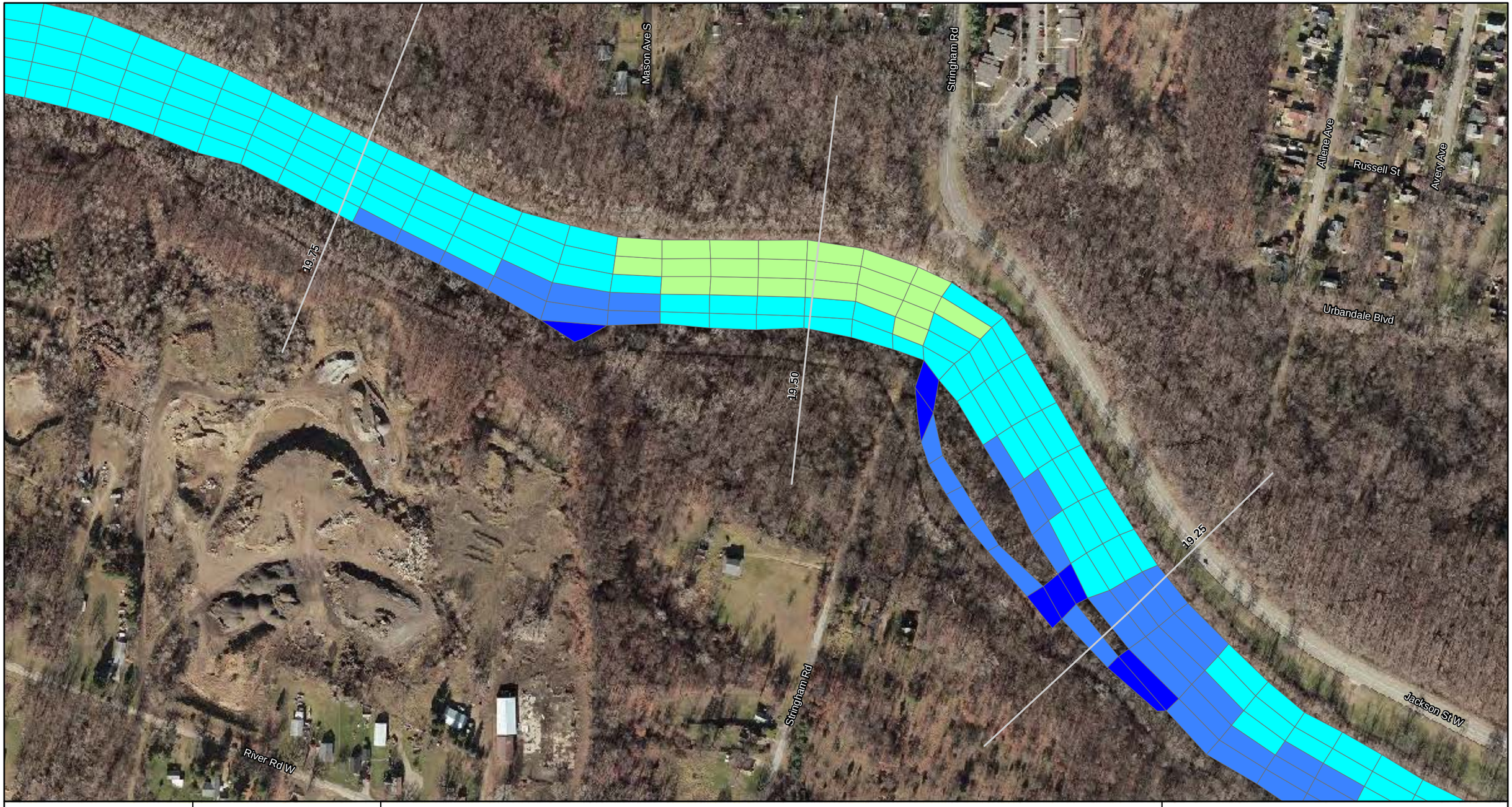
MP 18.30 - MP 19.15

SHEET 24 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May21_2011.mxd

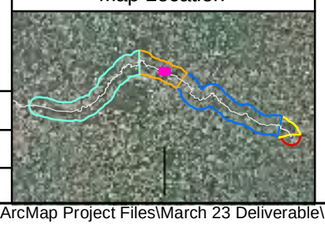
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

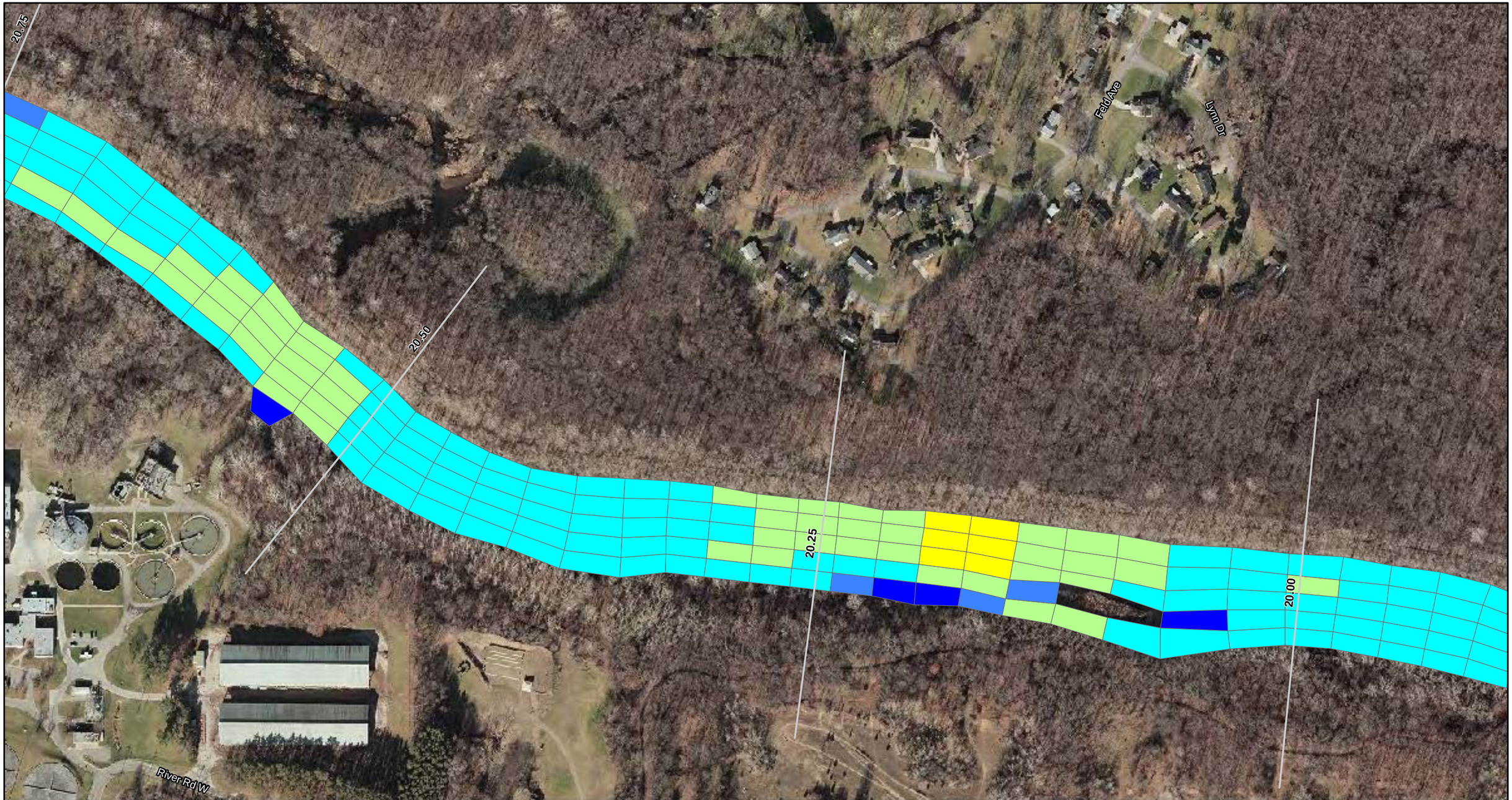
MP 19.10 - MP 19.95

SHEET 25 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
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- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

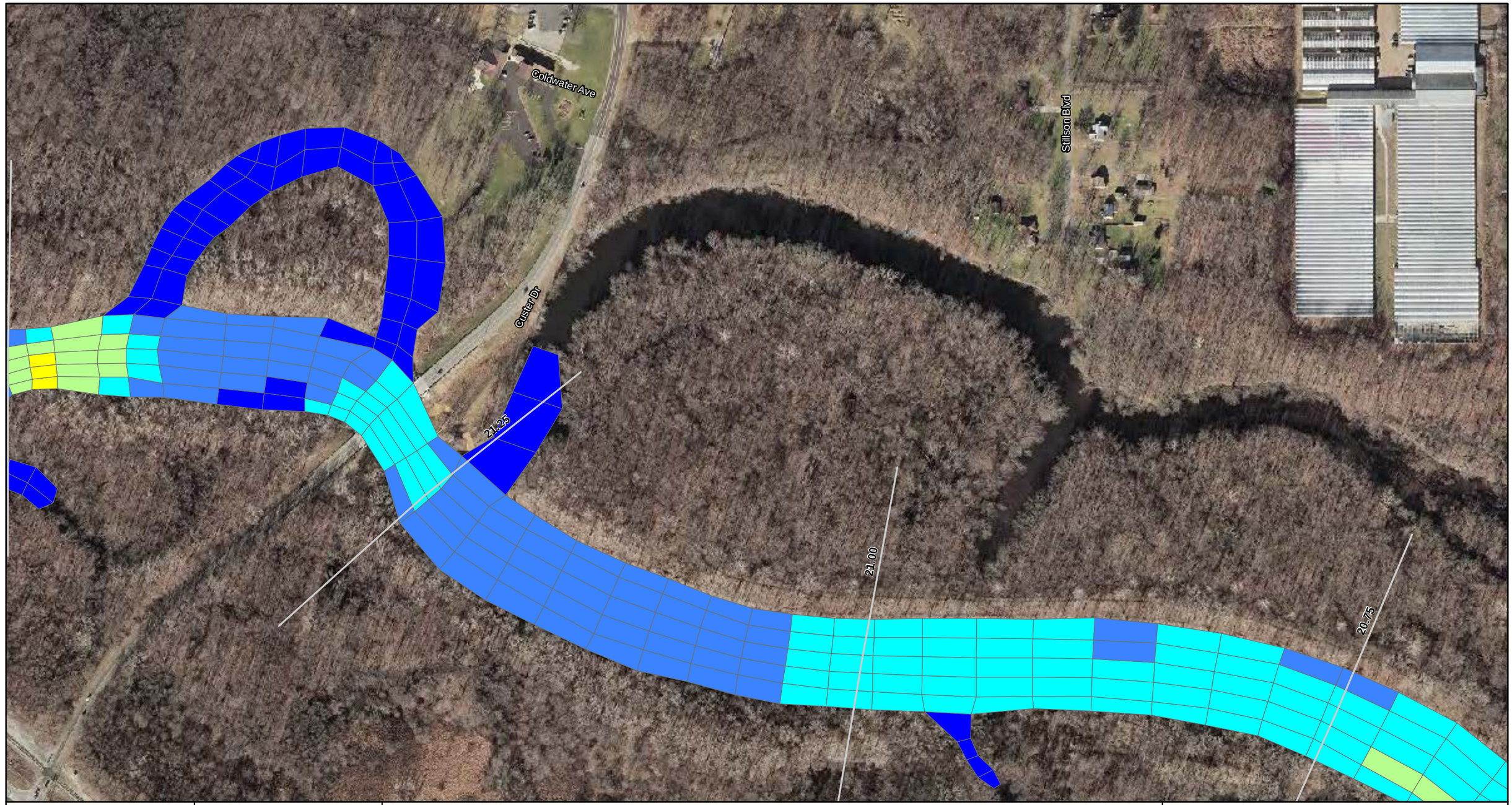
MP 19.90 - MP 20.75

SHEET 26 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May21_2011.mxd

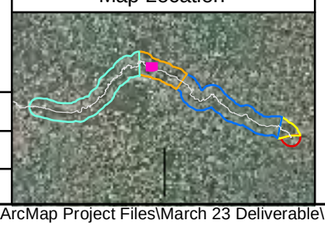
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
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- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

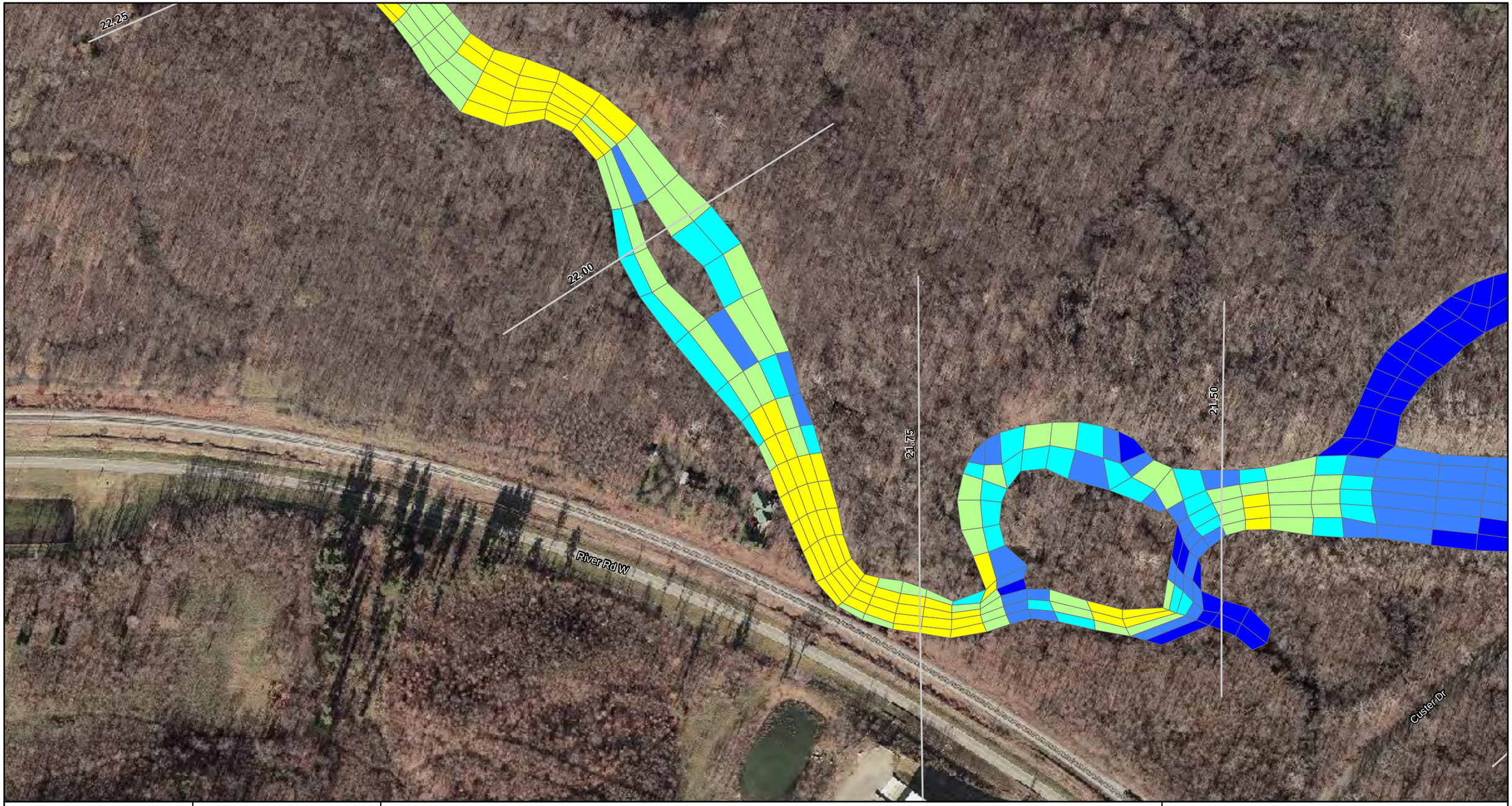
MP 20.70 - MP 21.50

SHEET 27 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

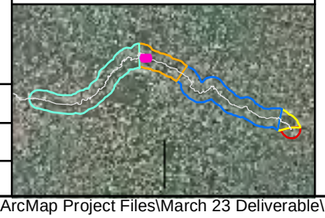
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May21_2011.mxd

Aerial Photography Date: November 2011



Drawn:	BRS 3/22/2012
Approved:	DBR 3/22/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
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- 5.000001 - 10.000000
- 10.000001 - 20.000000
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Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

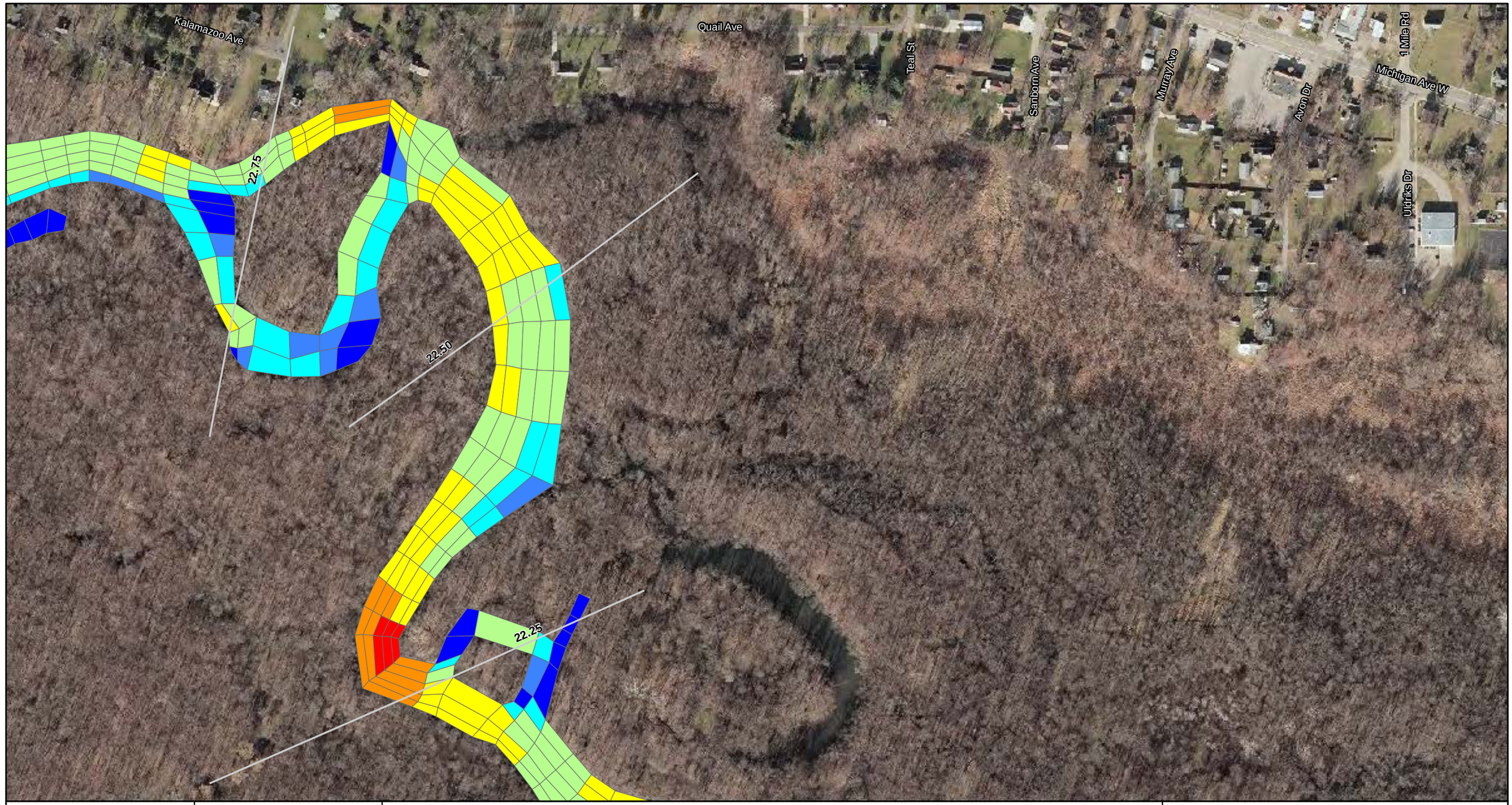
MP 21.35 - MP 22.15

SHEET 28 OF 56

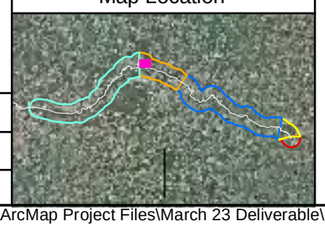
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May21_2011.mxd

Aerial Photography Date: November 2011



Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
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- 3.000001 - 5.000000
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- 10.000001 - 20.000000
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Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

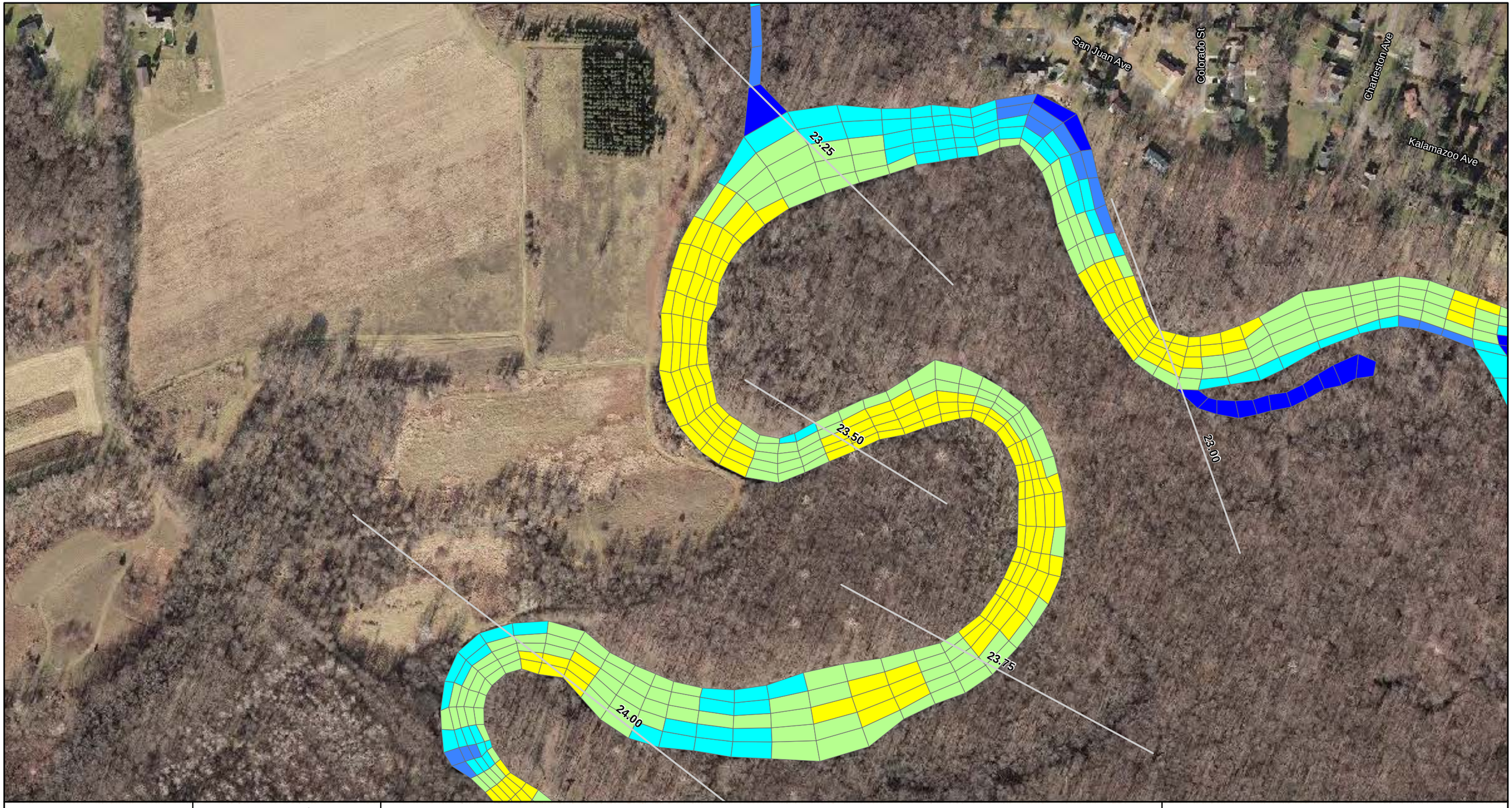
MP 22.15 - MP 22.90

SHEET 29 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May21_2011.mxd

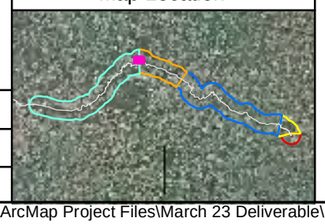
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

MP 22.80 - MP 24.10

SHEET 30 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

24.00
24.25
24.50
24.75
River Rd W
Fort Custer Dr
County Line Rd

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011
- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

MP 24.10 - MP 24.85

SHEET 31 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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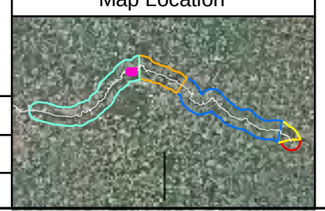
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
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Quarter Mile Grid Segment

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Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

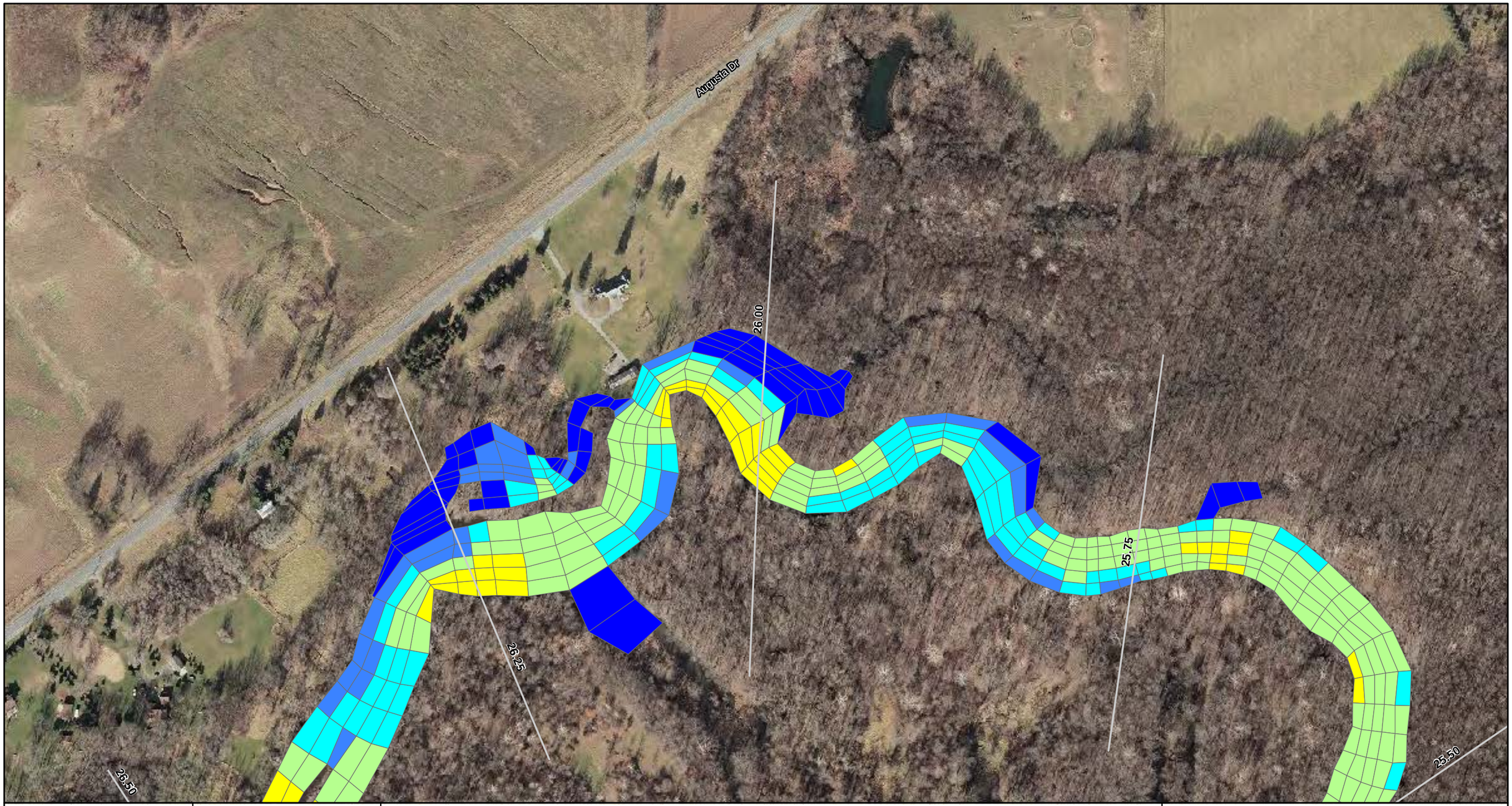
MP 24.80 - MP 25.65

SHEET 32 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

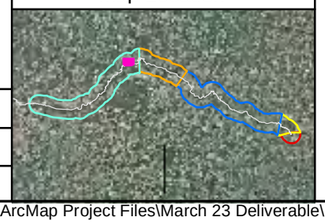
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Aerial Photography Date: November 2011



Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
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Quarter Mile Grid Segment

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Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

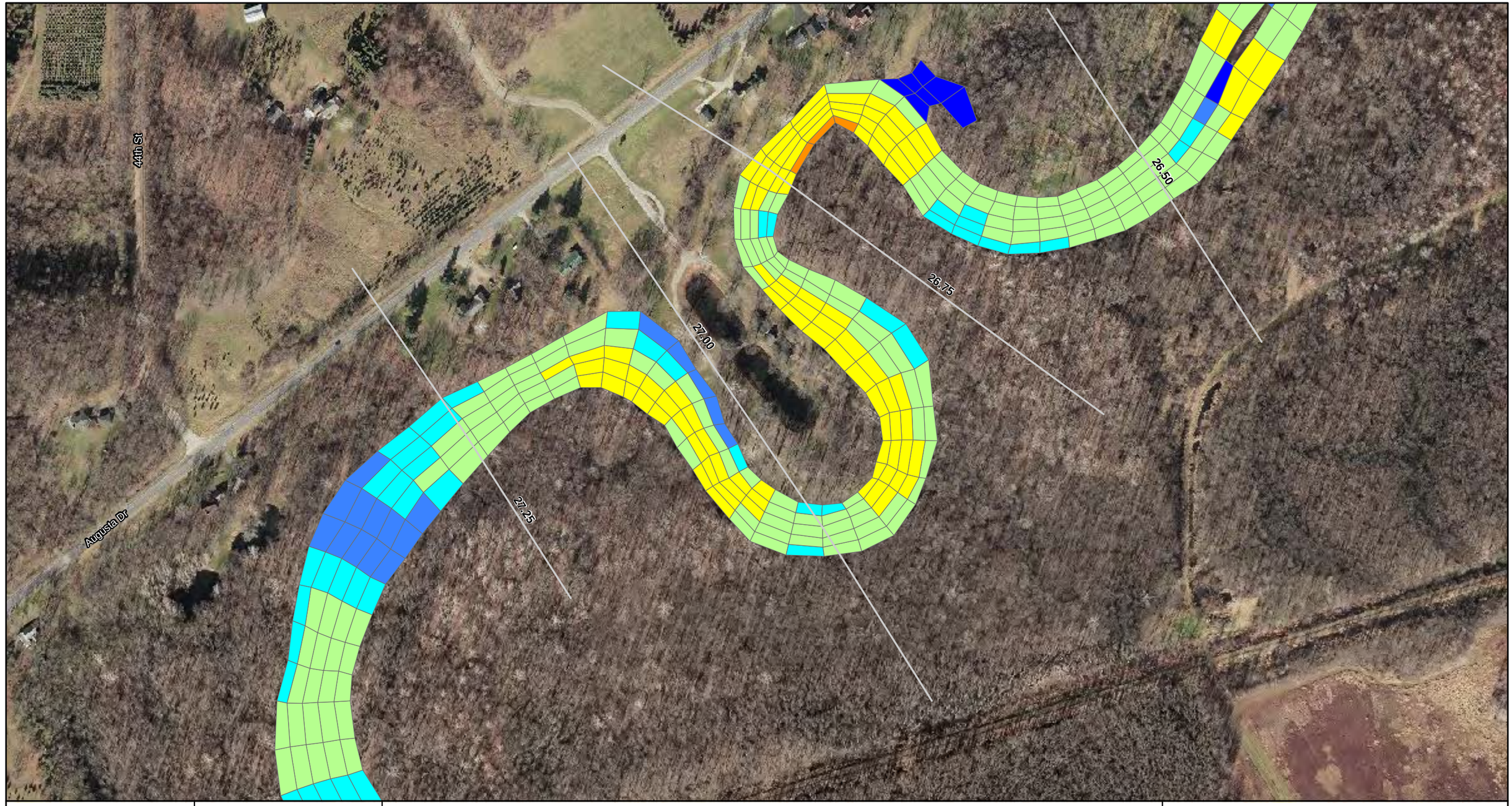
MP 25.55 - MP 26.40

SHEET 33 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

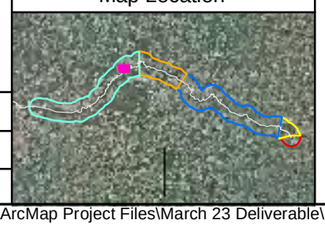
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Aerial Photography Date: November 2011



Drawn:	BRS 3/22/2012
Approved:	DBR 3/22/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

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Quarter Mile Grid Segment

Pa = Pascals
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

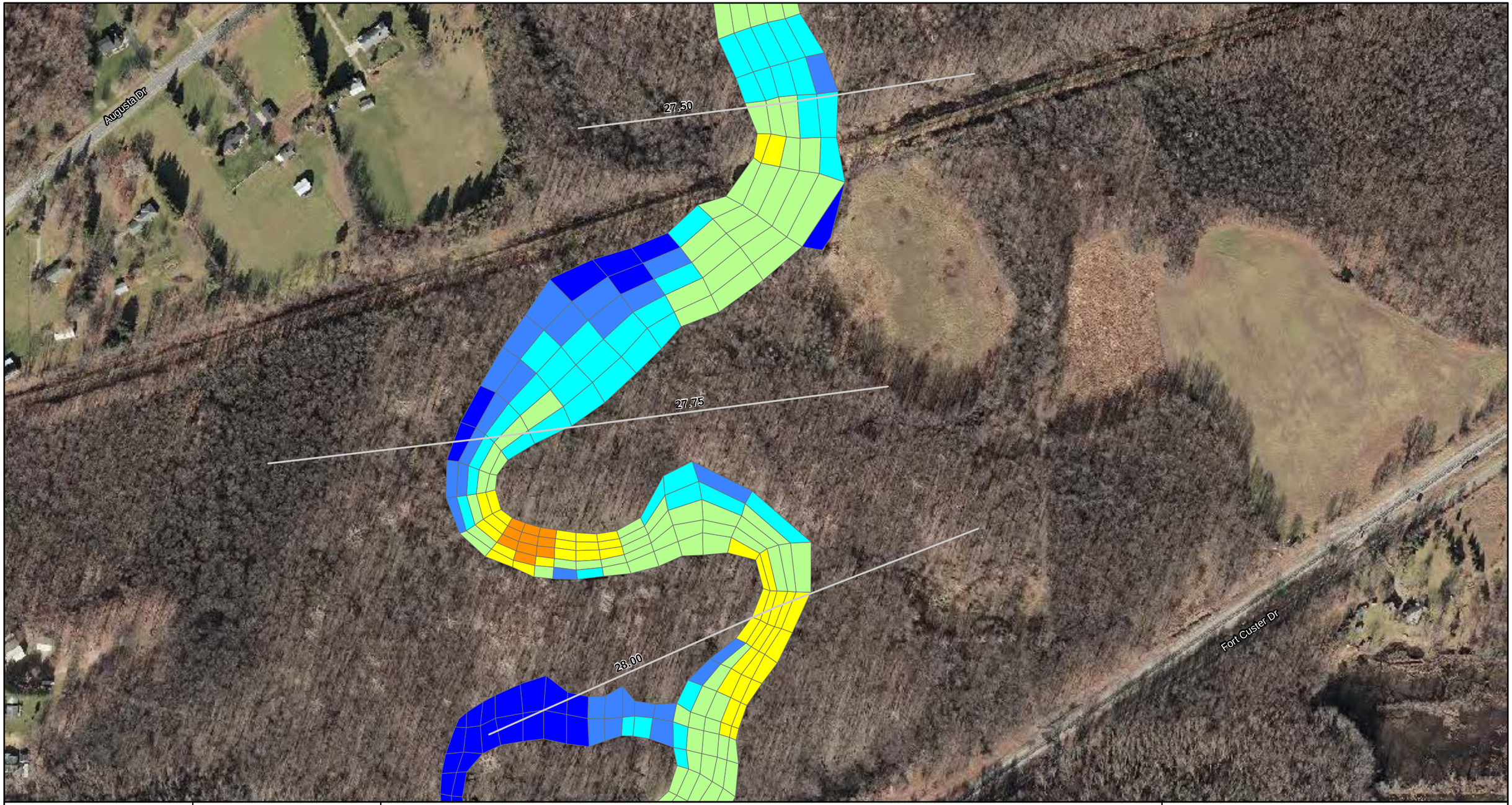
MP 26.40 - MP 27.45

SHEET 34 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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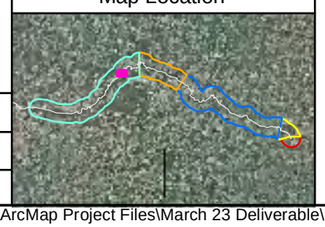
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011
- < 1.000001
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Quarter Mile Grid Segment

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Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

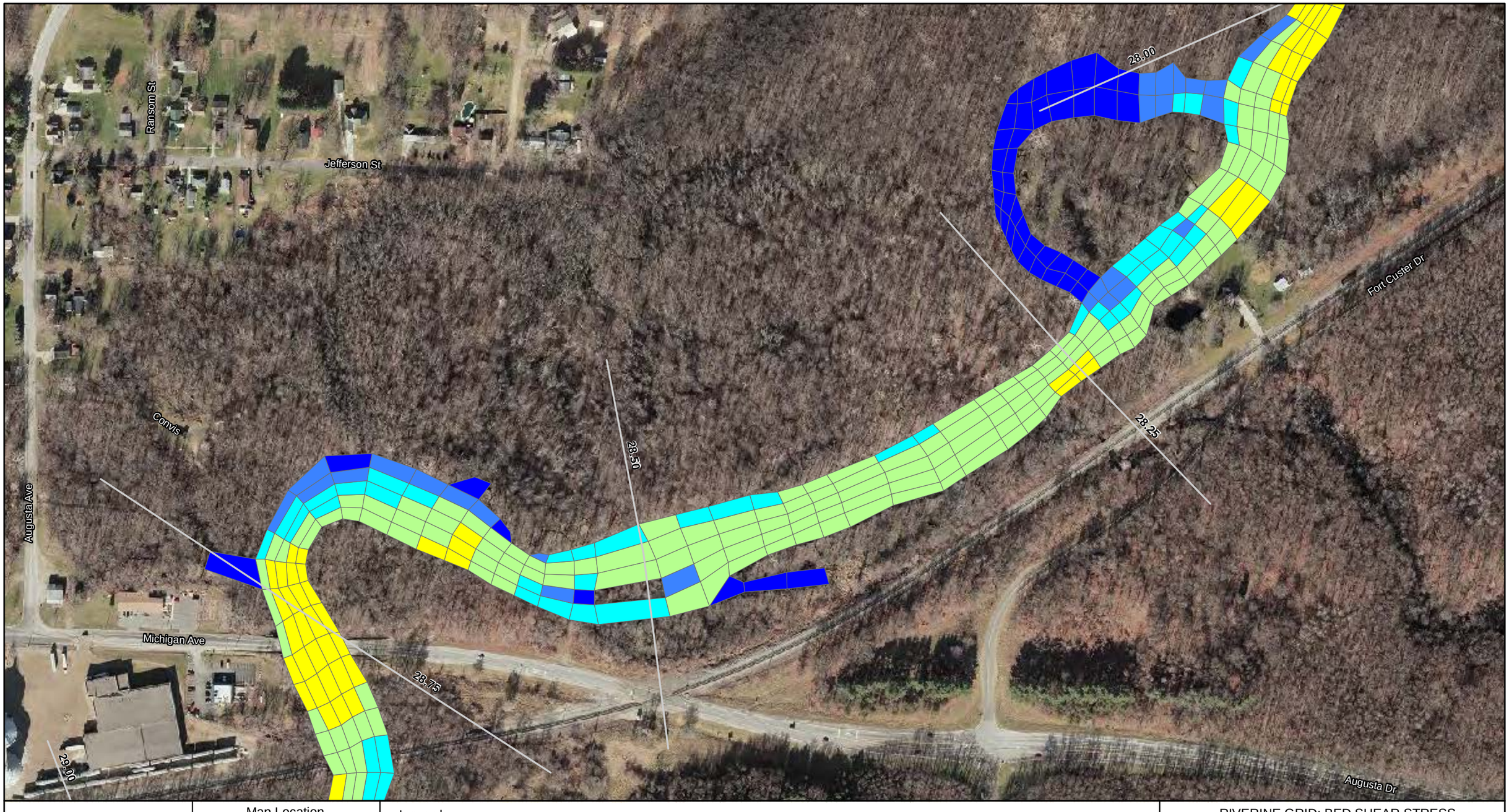
MP 27.45 - MP 28.10

SHEET 35 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May21_2011.mxd

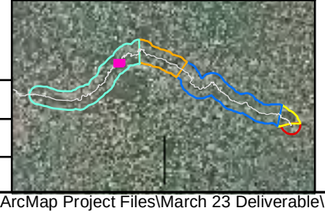
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
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- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

MP 28.05 - MP 28.85

SHEET 36 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

Clinton St
Clinton St
Chestnut St
Webster St
Church St
Fayette St
Cass St
Cherry St
Lincoln St
28.75
29.00
29.25
29.50
Augusta Climax Rd
Fort Custer Rec Area Access

Drawn:	BRS 3/22/2012
Approved:	DBR 3/22/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

MP 28.85 - MP29.55

SHEET 37 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

29.50

29.75

Fort Custer Rec Area Service

Fort Custer Rec Area Access

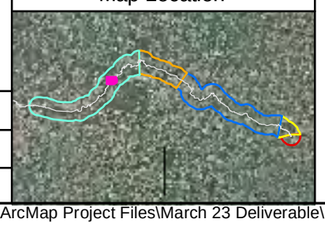
30.25

30.00

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

MP 29.50 - MP29.95

SHEET 38 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

MP 29.95 - MP 30.80

SHEET 39 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011
- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

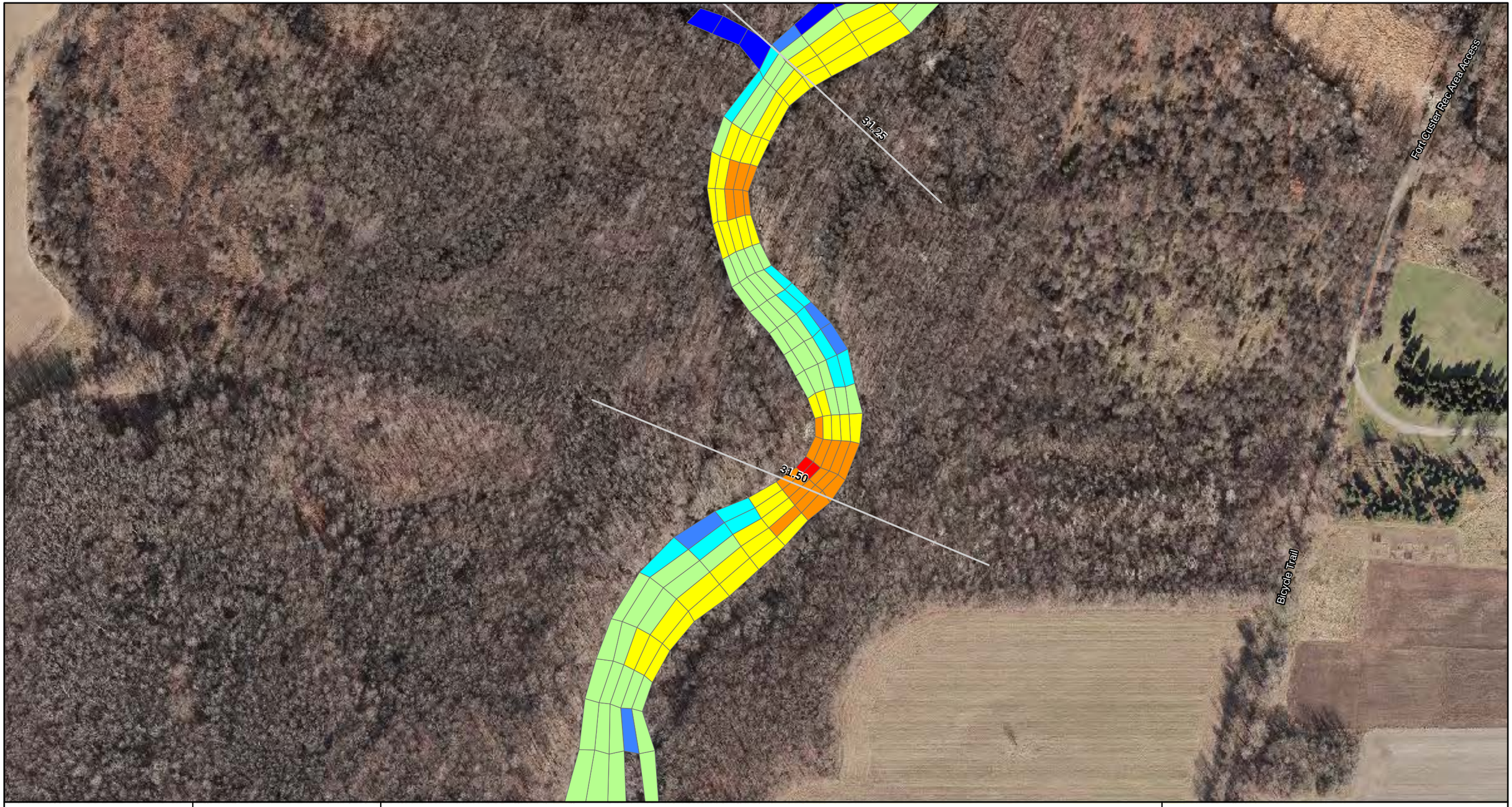
MP 30.75 - MP 31.25

SHEET 40 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May21_2011.mxd

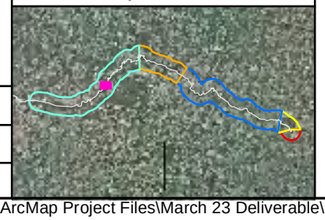
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

MP 31.25 - MP 31.70

SHEET 41 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May21_2011.mxd

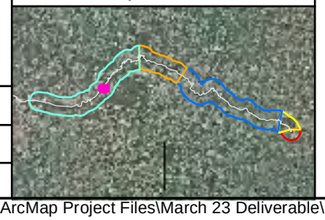
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

MP 31.65 - MP 32.25

SHEET 42 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May21_2011.mxd

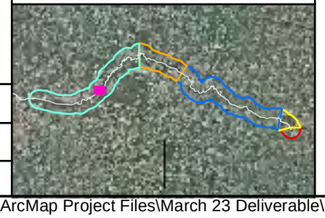
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

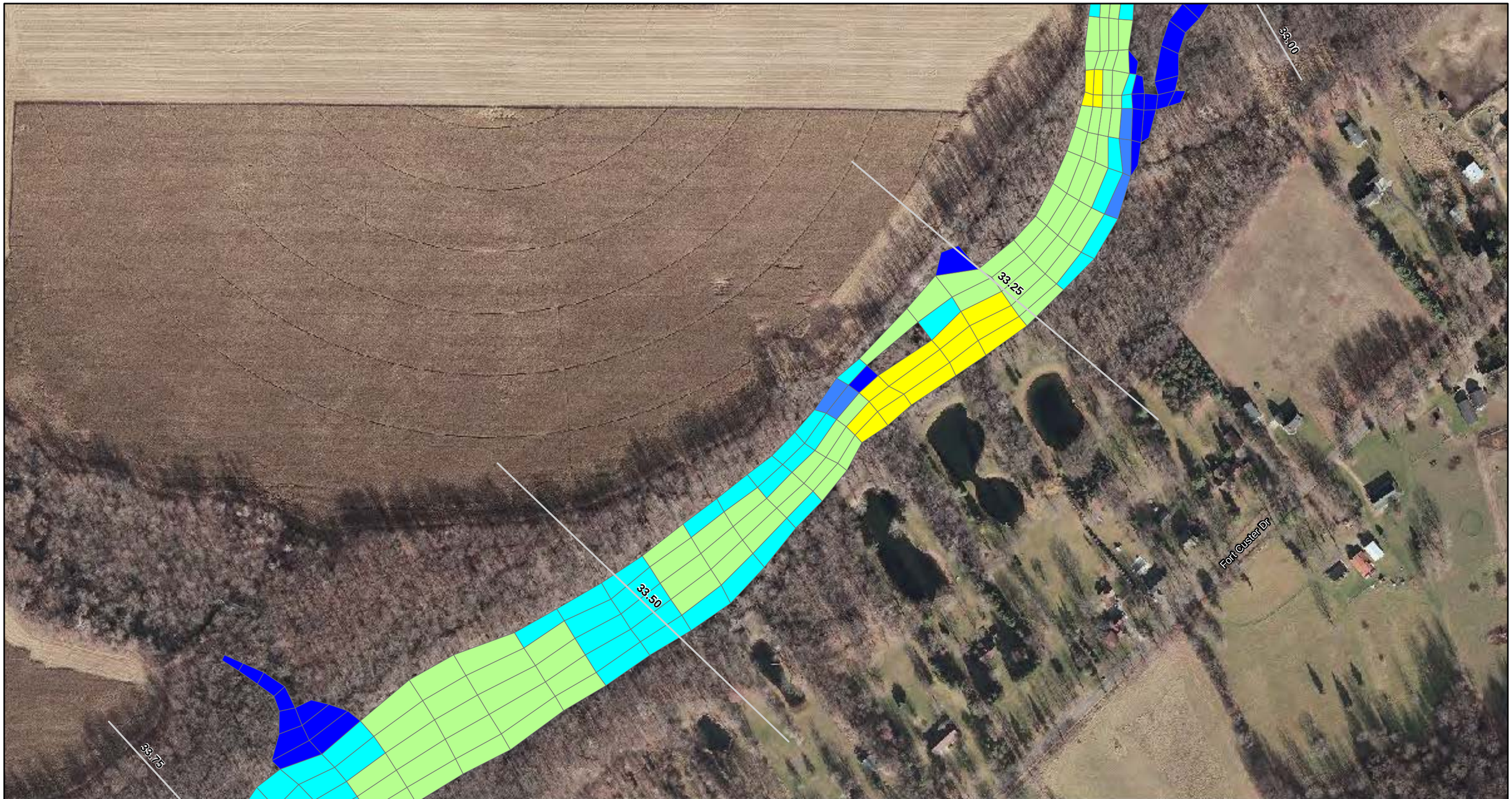
MP 32.25 - MP 33.10

SHEET 43 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

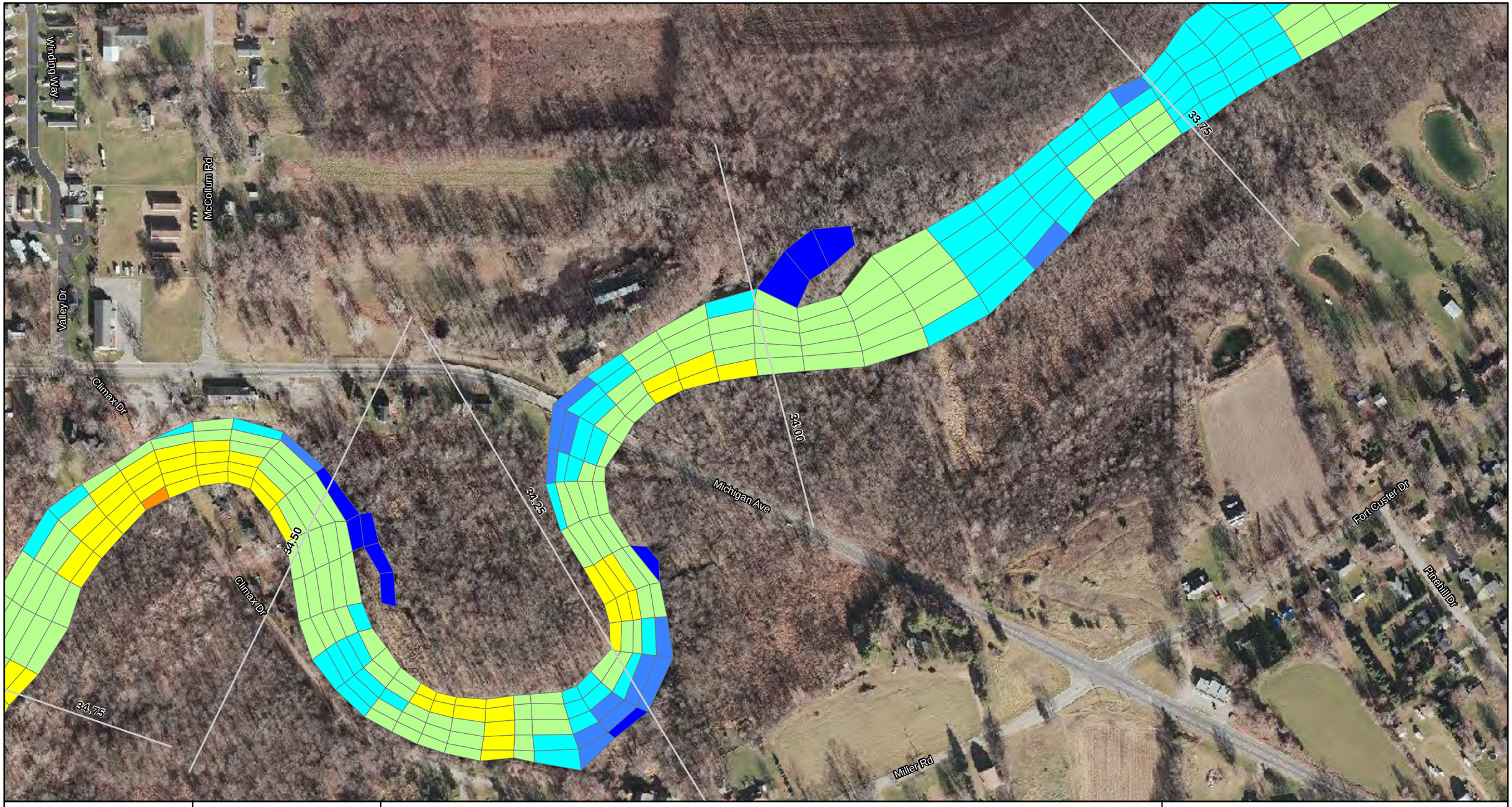
MP 33.10 - MP 33.70

SHEET 44 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

MP 33.70 - MP 34.70

SHEET 45 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

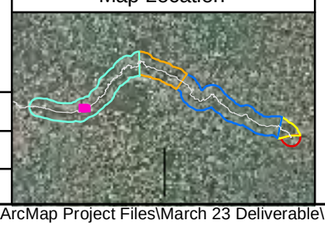
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Aerial Photography Date: November 2011



Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

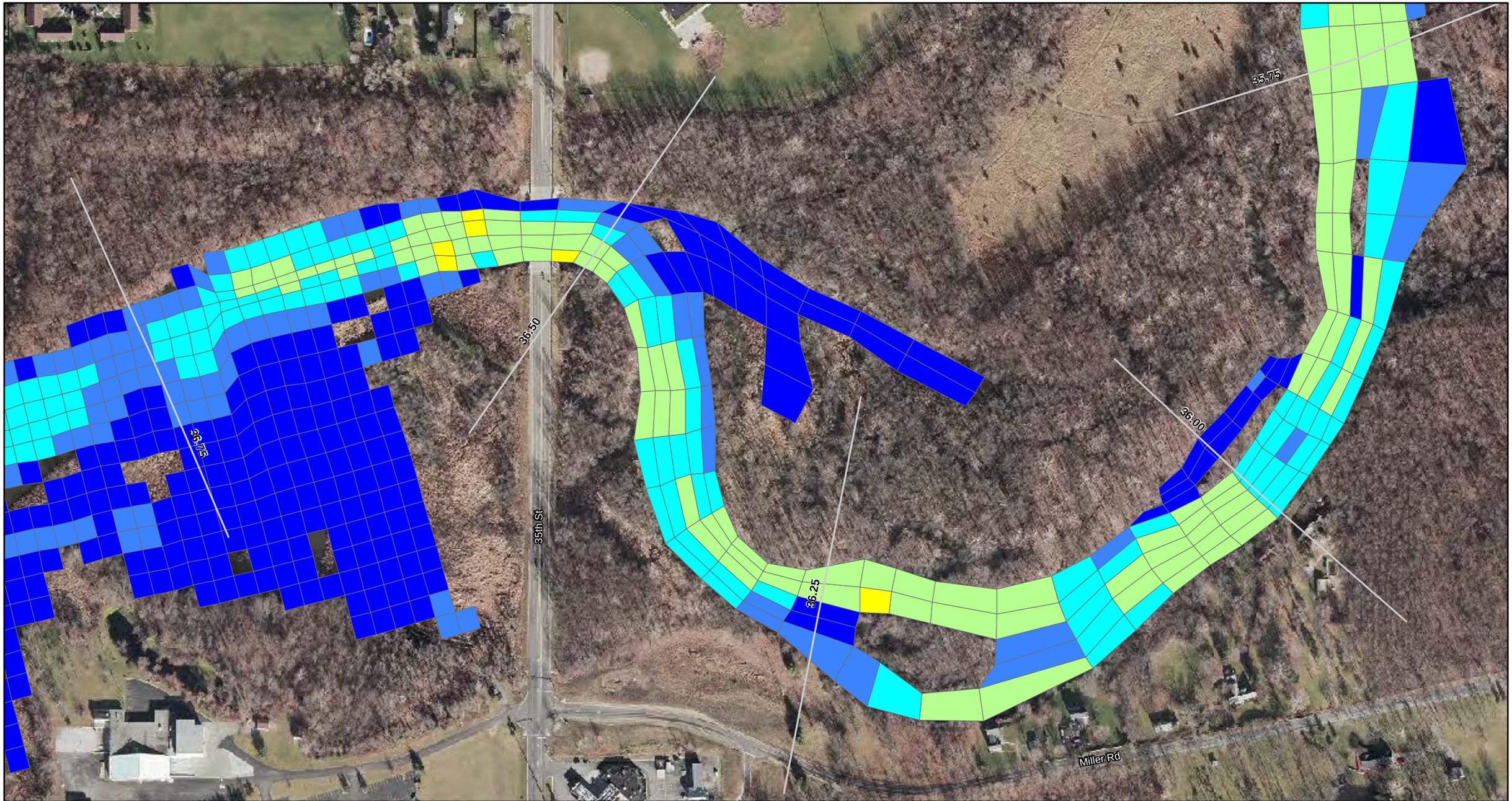
MP 34.70 - MP 35.75

SHEET 46 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

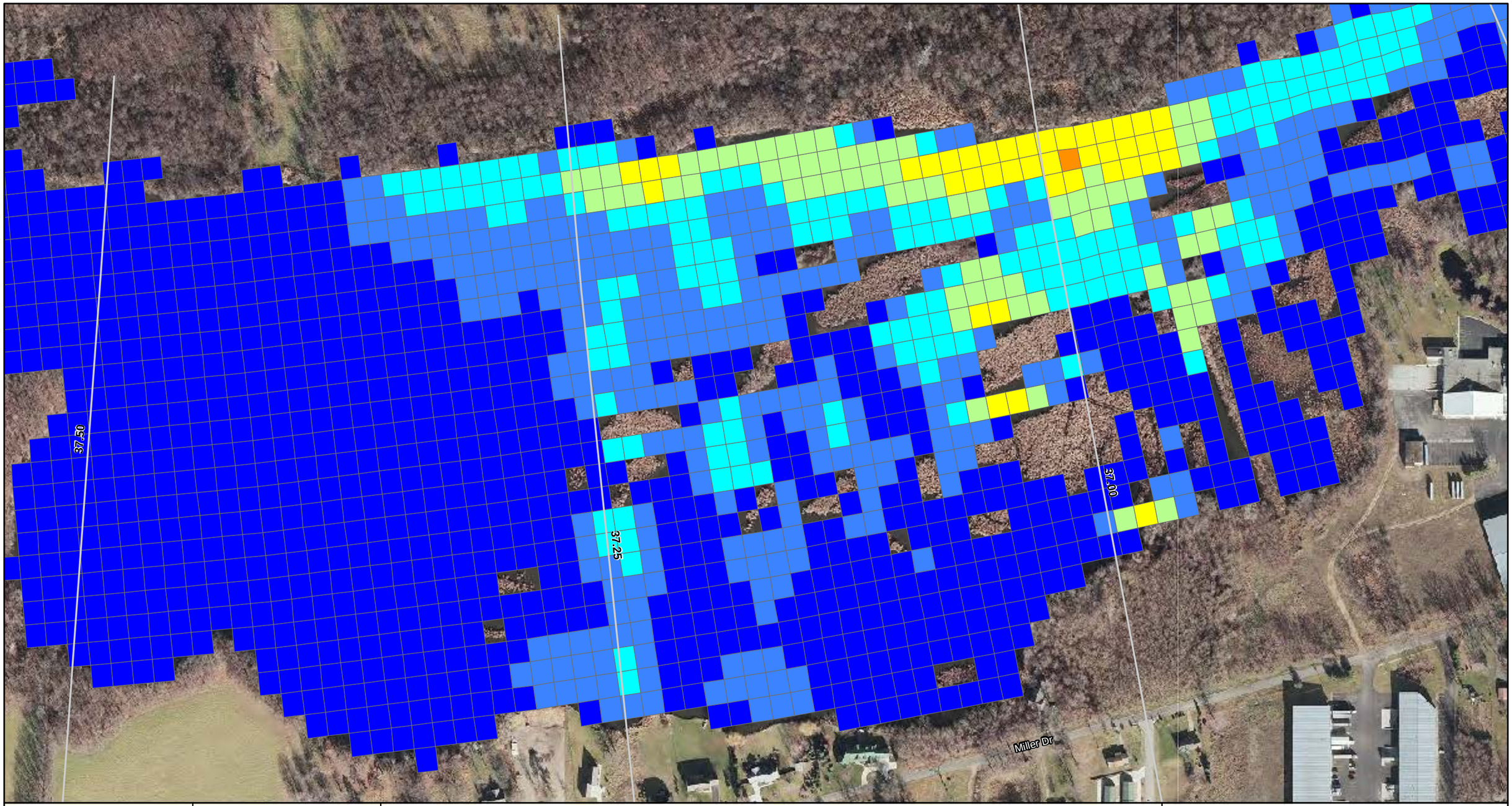
MP 35.75 - MP 36.80

SHEET 47 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May21_2011.mxd

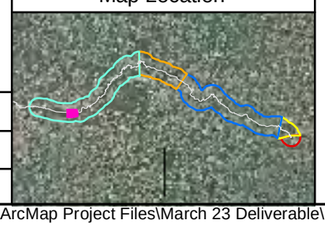
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

MP 36.80 - MP 37.55

SHEET 48 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May21_2011.mxd

Aerial Photography Date: November 2011

38.25

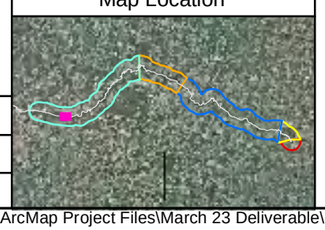
38.00

37.75

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

MP 37.55 - MP 38.30

SHEET 49 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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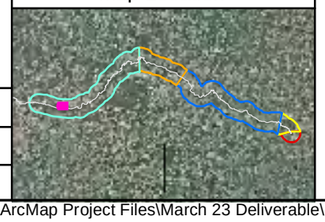
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

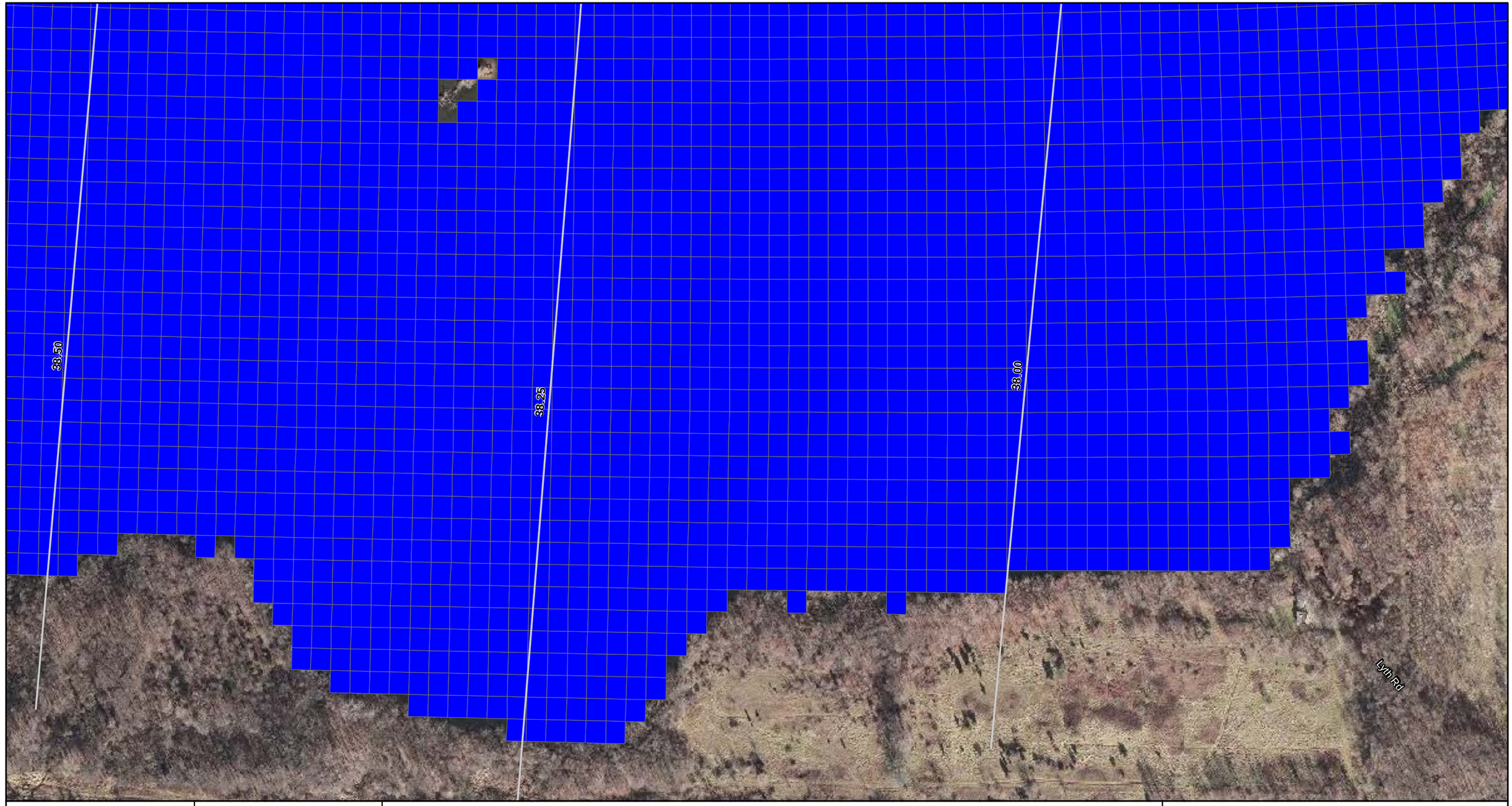
MP 37.80 - MP 38.60N

SHEET 50 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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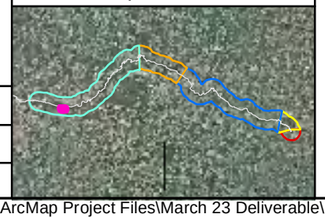
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

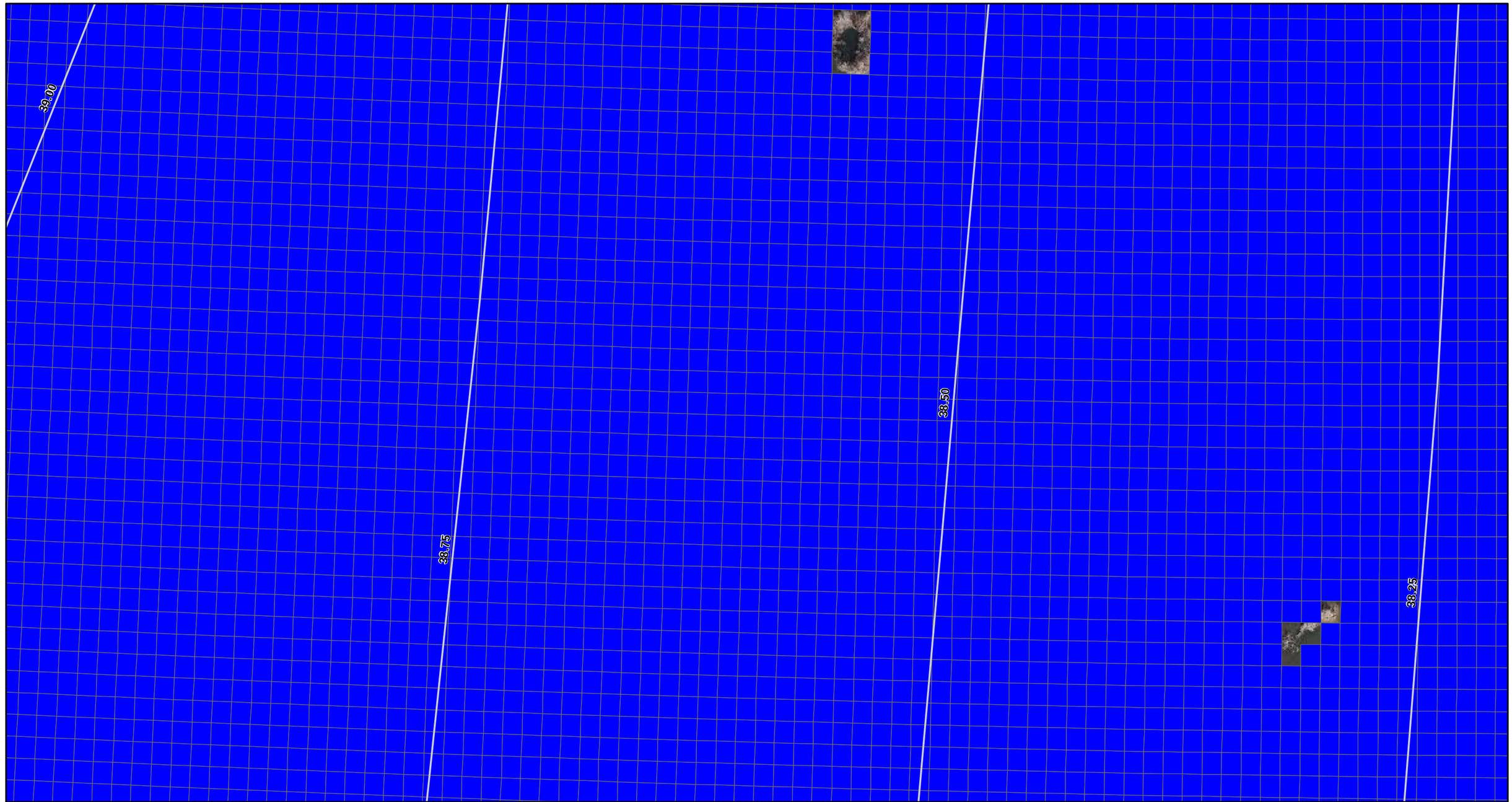
MP 37.80 - MP 38.60S

SHEET 51 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May21_2011.mxd

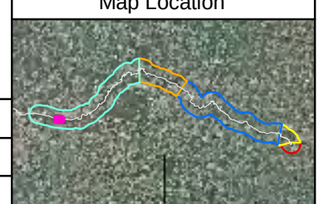
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

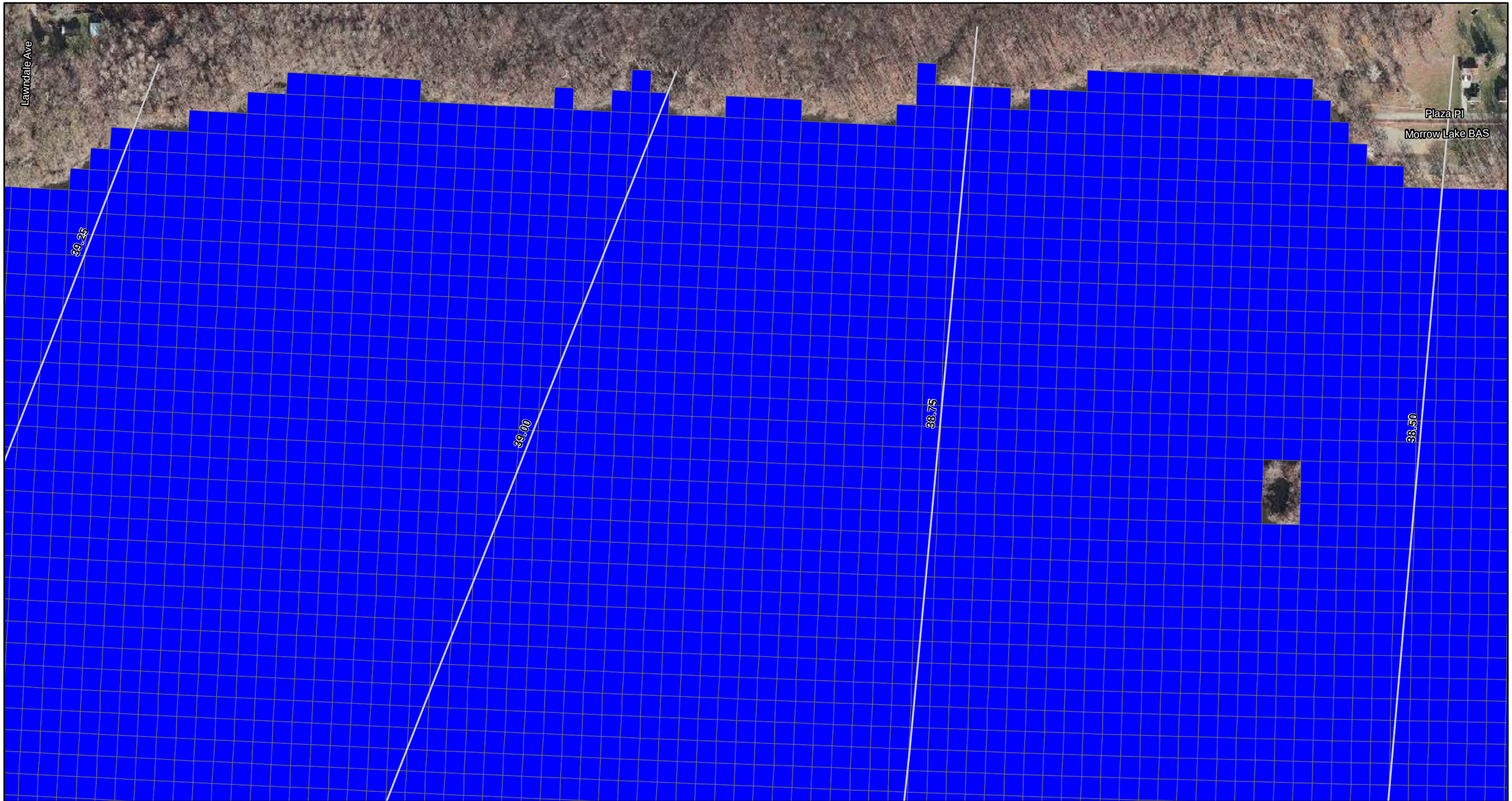
MP 38.25 - MP 39.00C

SHEET 52 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals

cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

MP 38.50 - MP 39.25N

SHEET 53 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

39.25

39.00

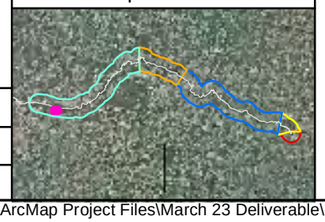
38.75

38.50

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

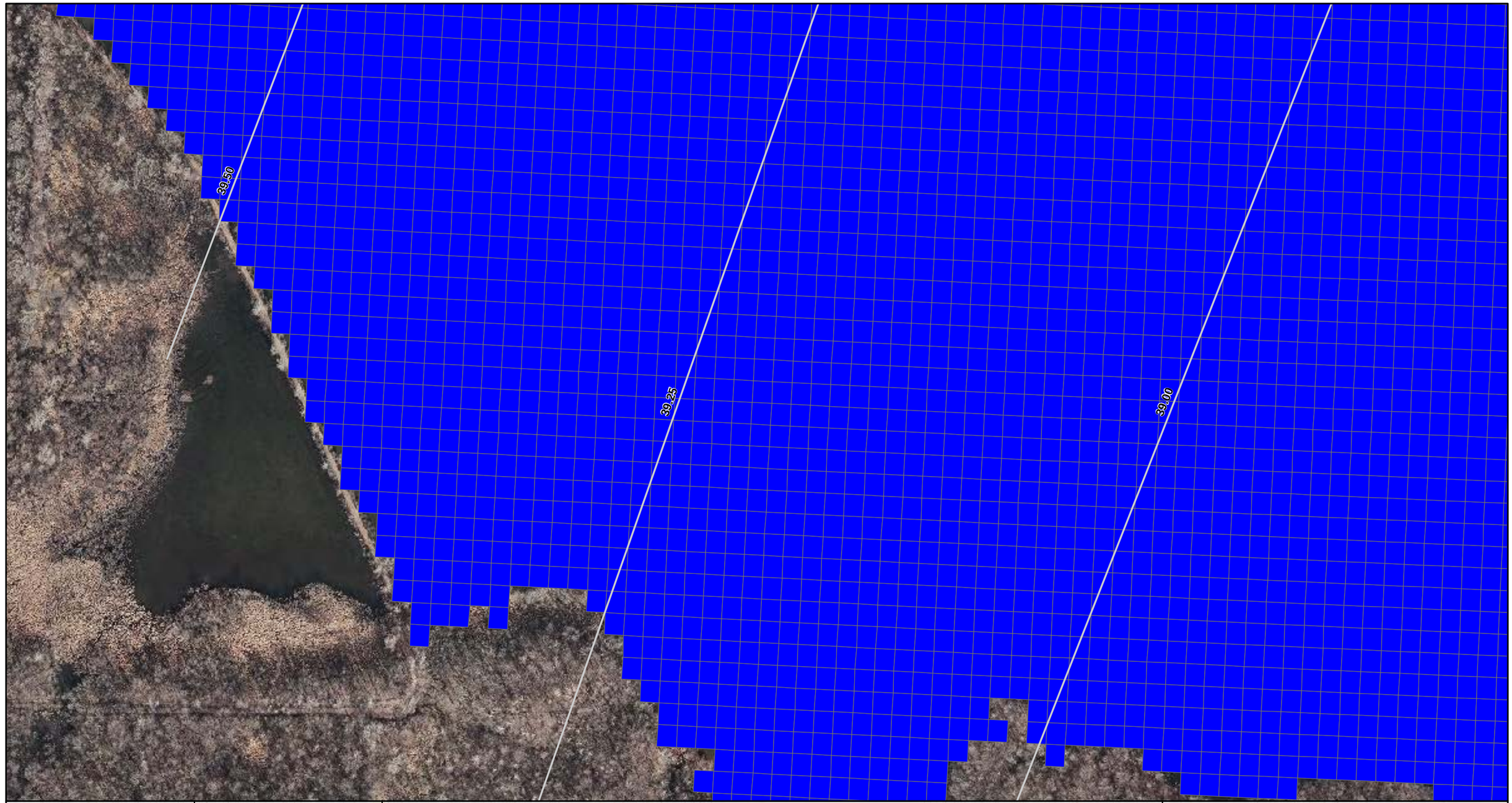
MP 38.50 - MP 39.25S

SHEET 54 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May21_2011.mxd

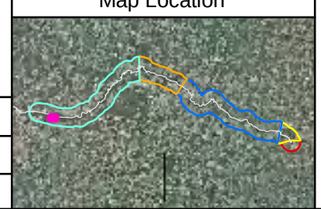
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

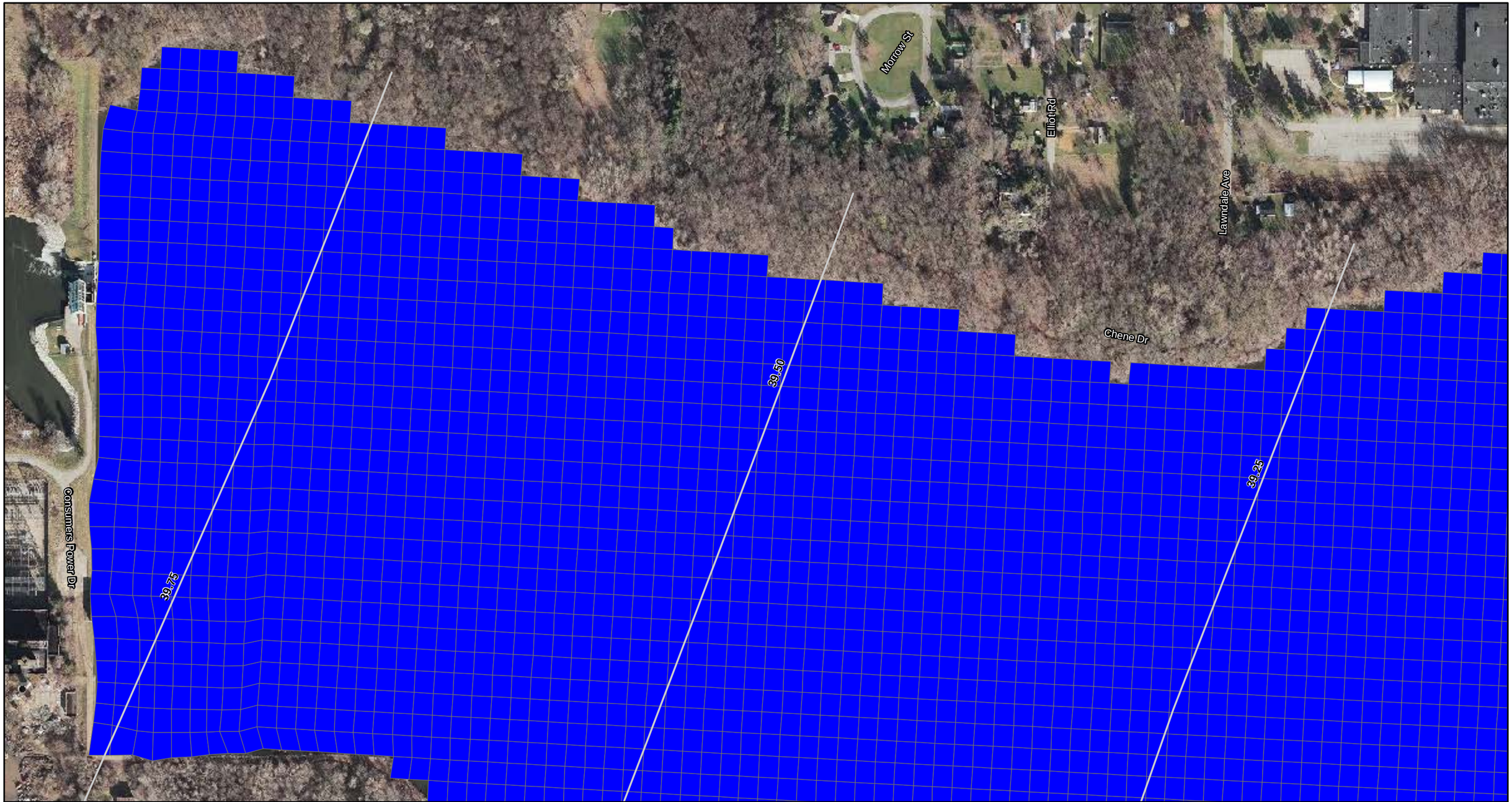
MP 38.90 - MP 39.60S

SHEET 55 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May21_2011.mxd

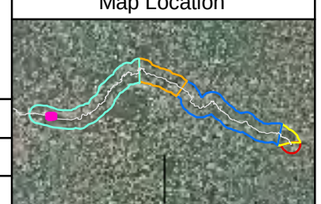
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 21, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,550 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 21, 2011

MP 39.15 - MP 39.85

SHEET 56 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May21_2011.mxd

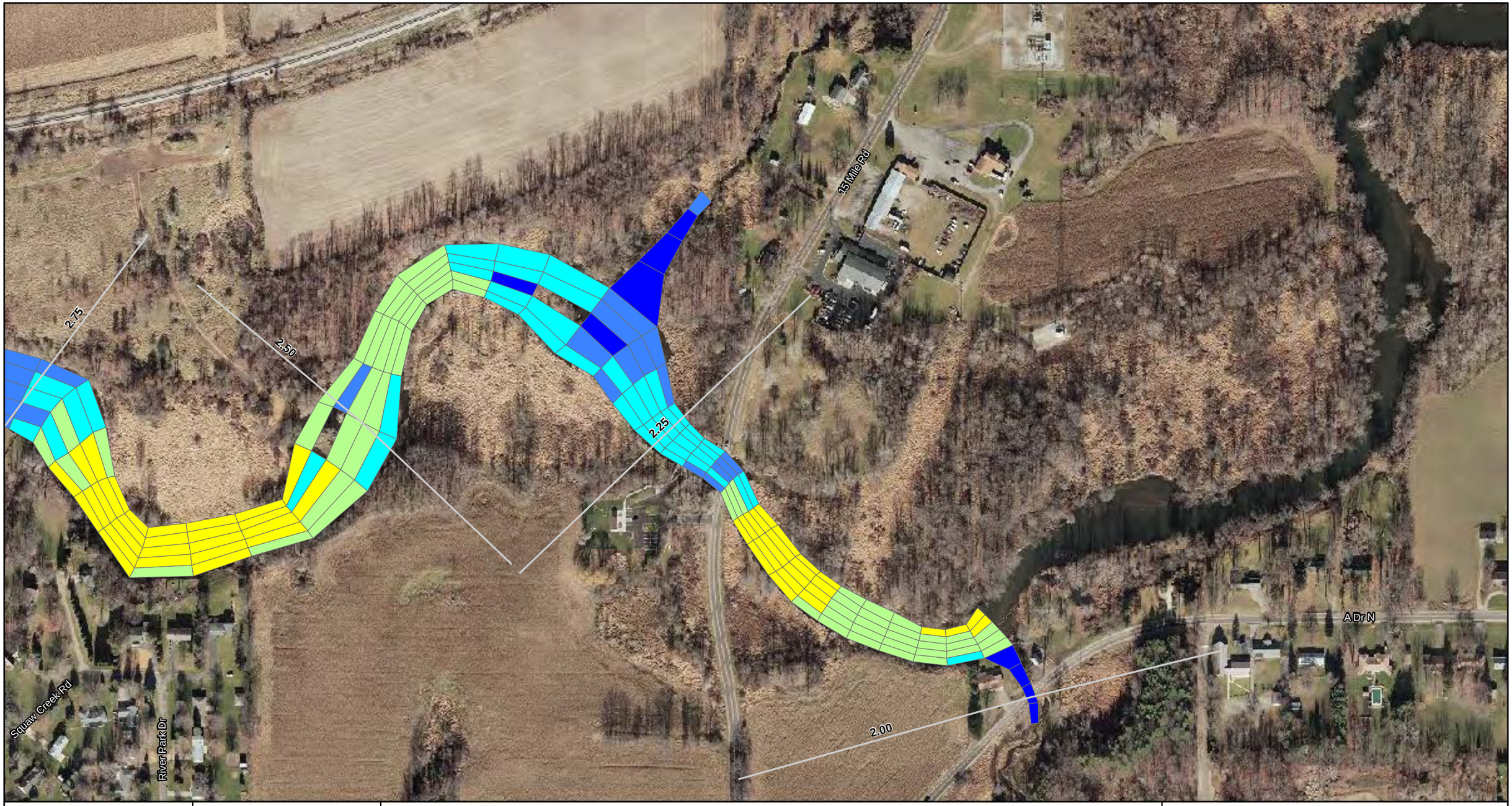
Aerial Photography Date: November 2011

Figure 5-12

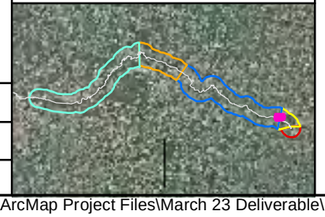
Riverine Grid: Bed Shear Stress

May 23, 2011

Sheets 1 through 56



Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500
Scale in Feet

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

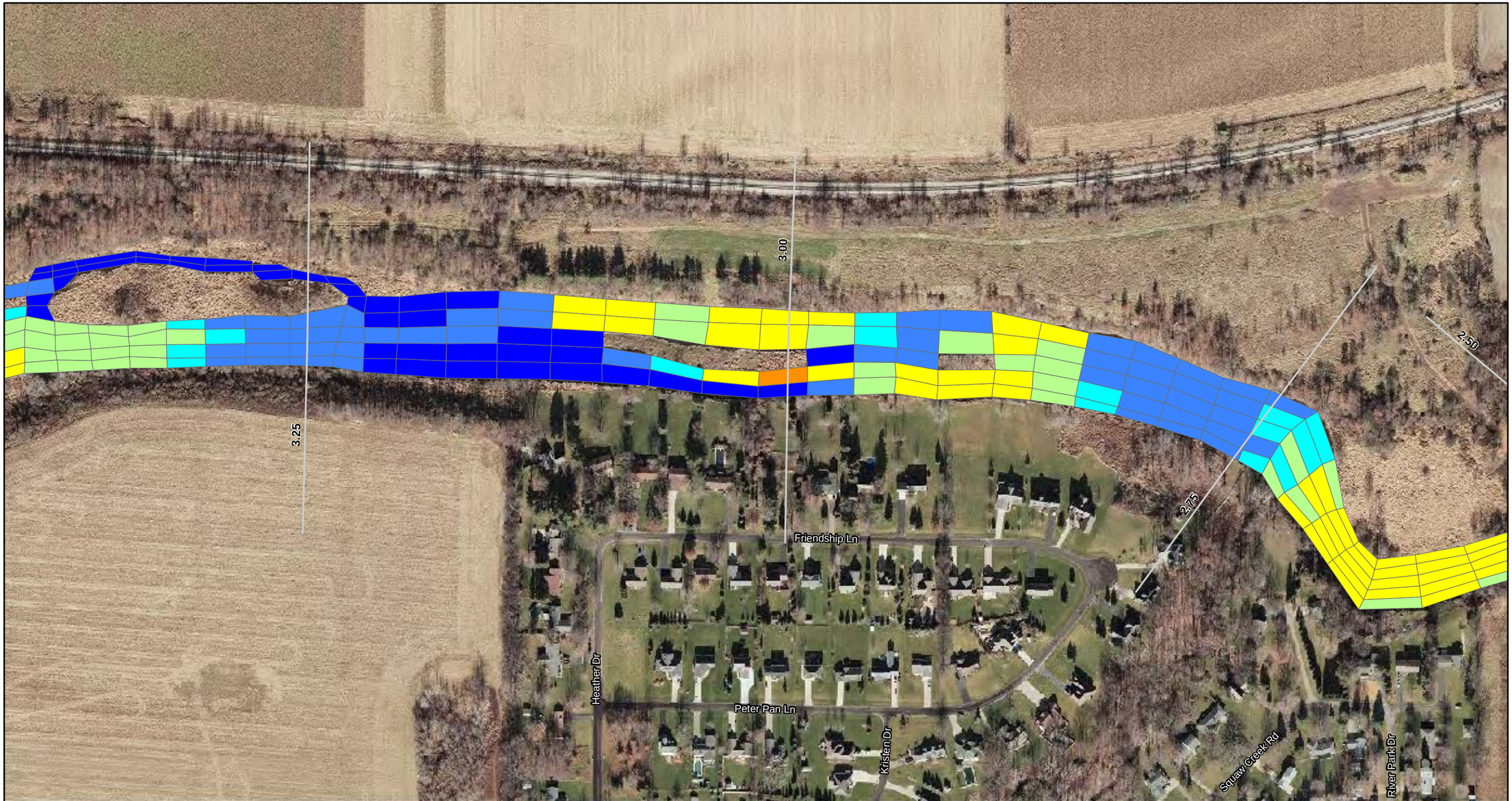
MP 01.95 - MP 02.75

SHEET 1 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May23_2011.mxd

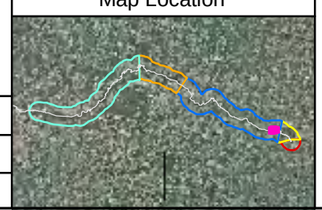
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

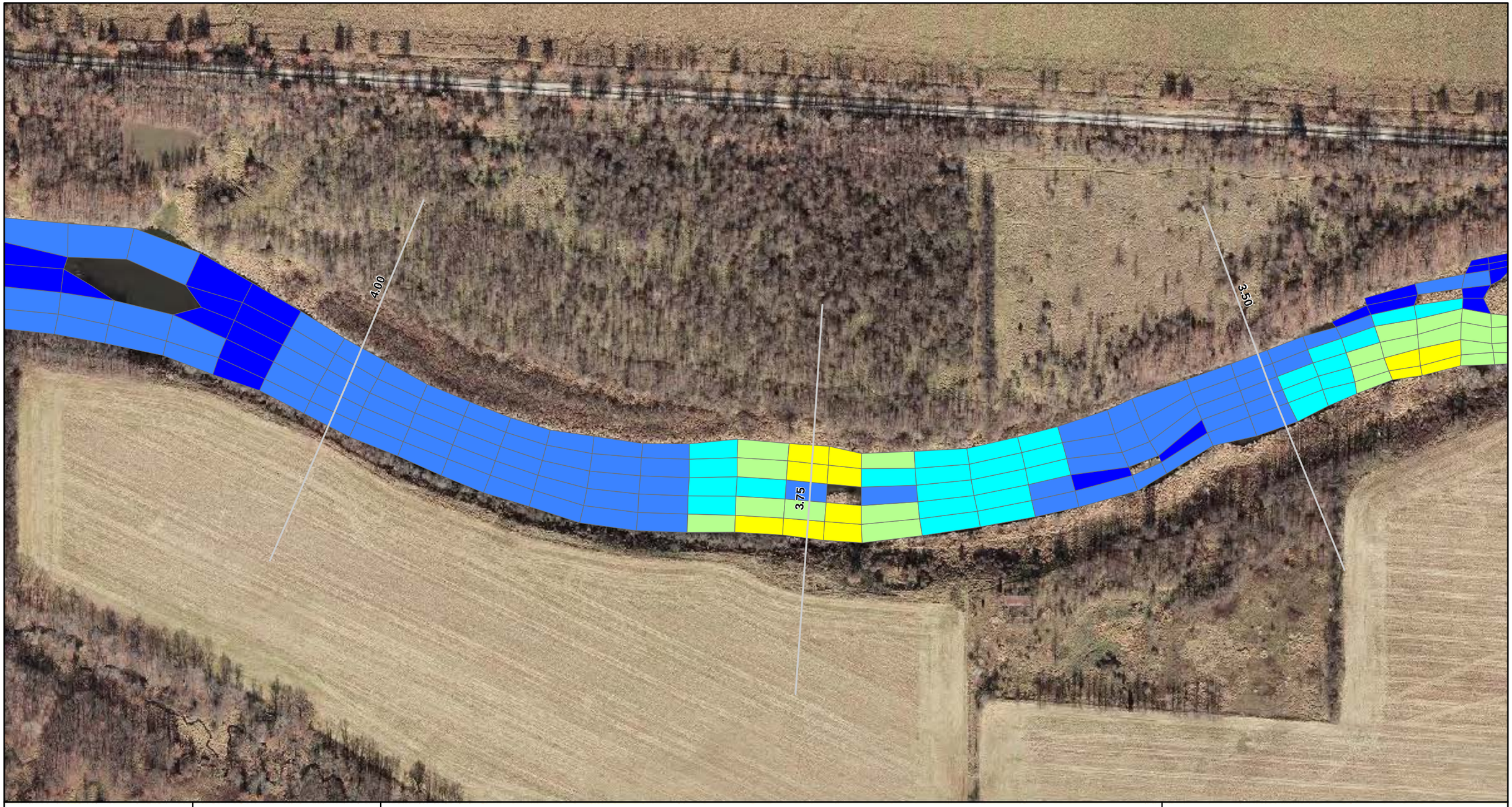
MP 02.60 - MP 03.40

SHEET 2 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May23_2011.mxd

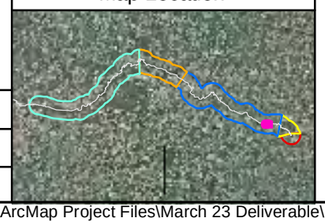
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

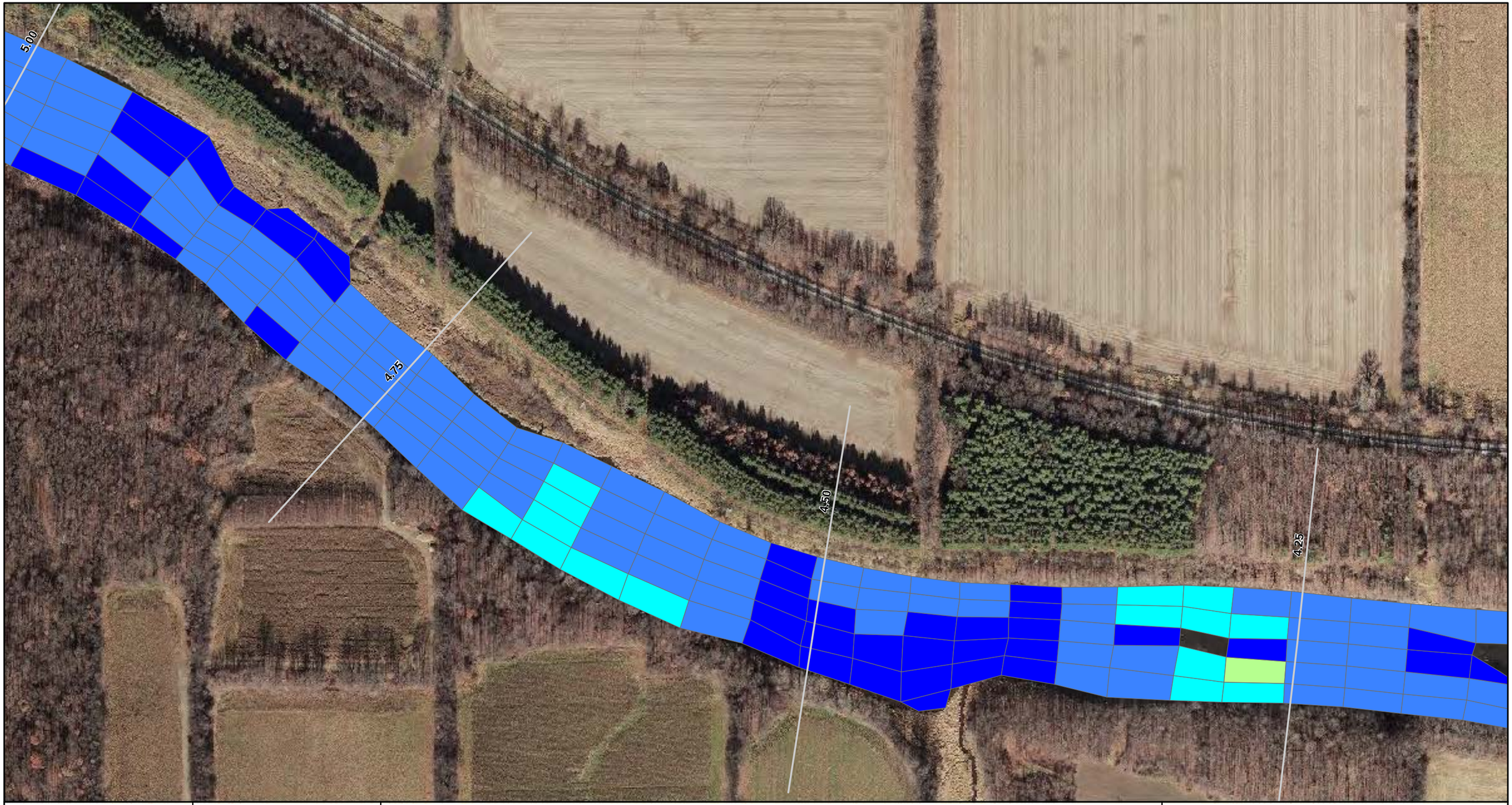
MP 03.40 - MP 04.20

SHEET 3 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

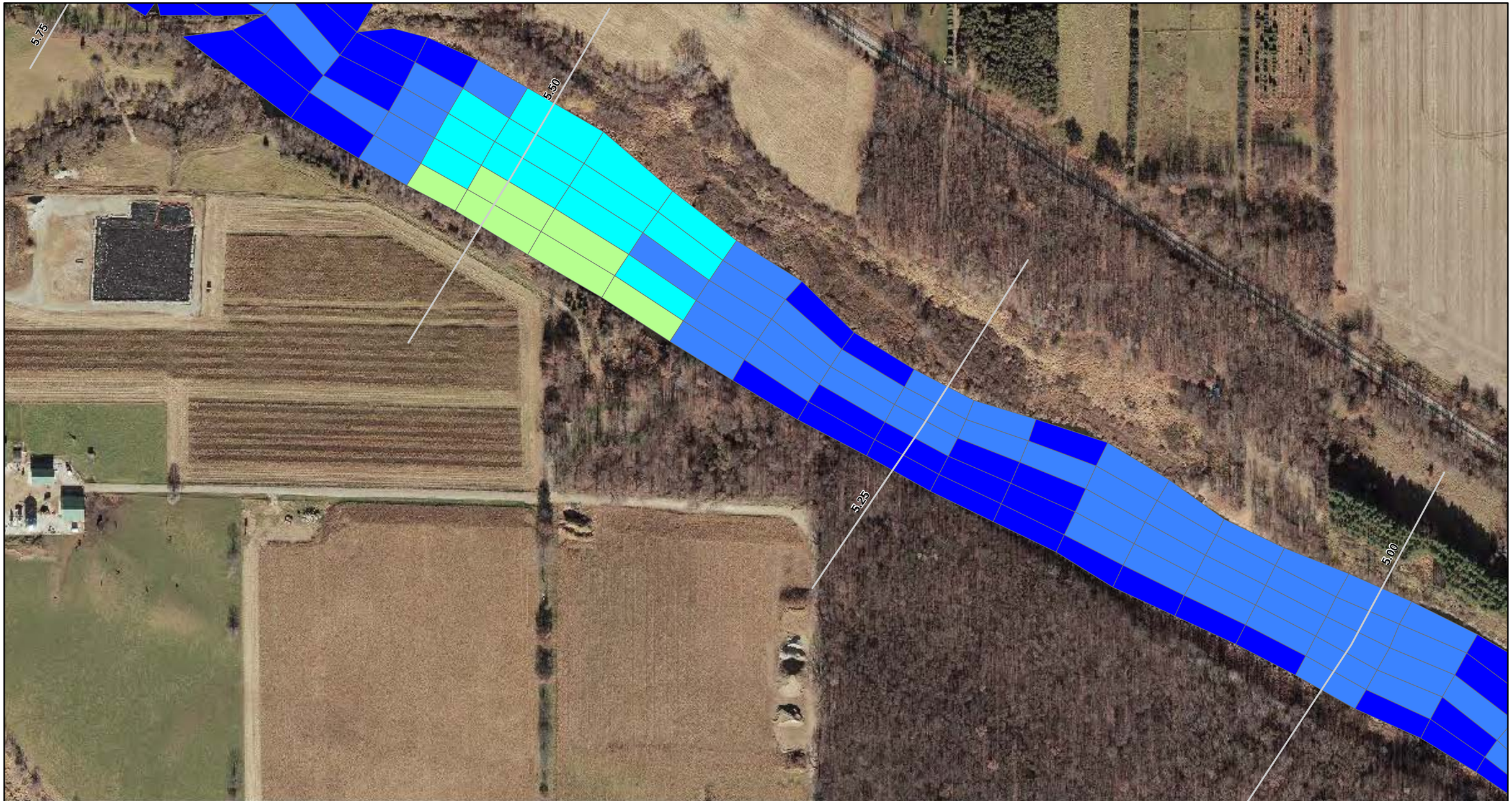
MP 04.15 - MP 05.00

SHEET 4 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

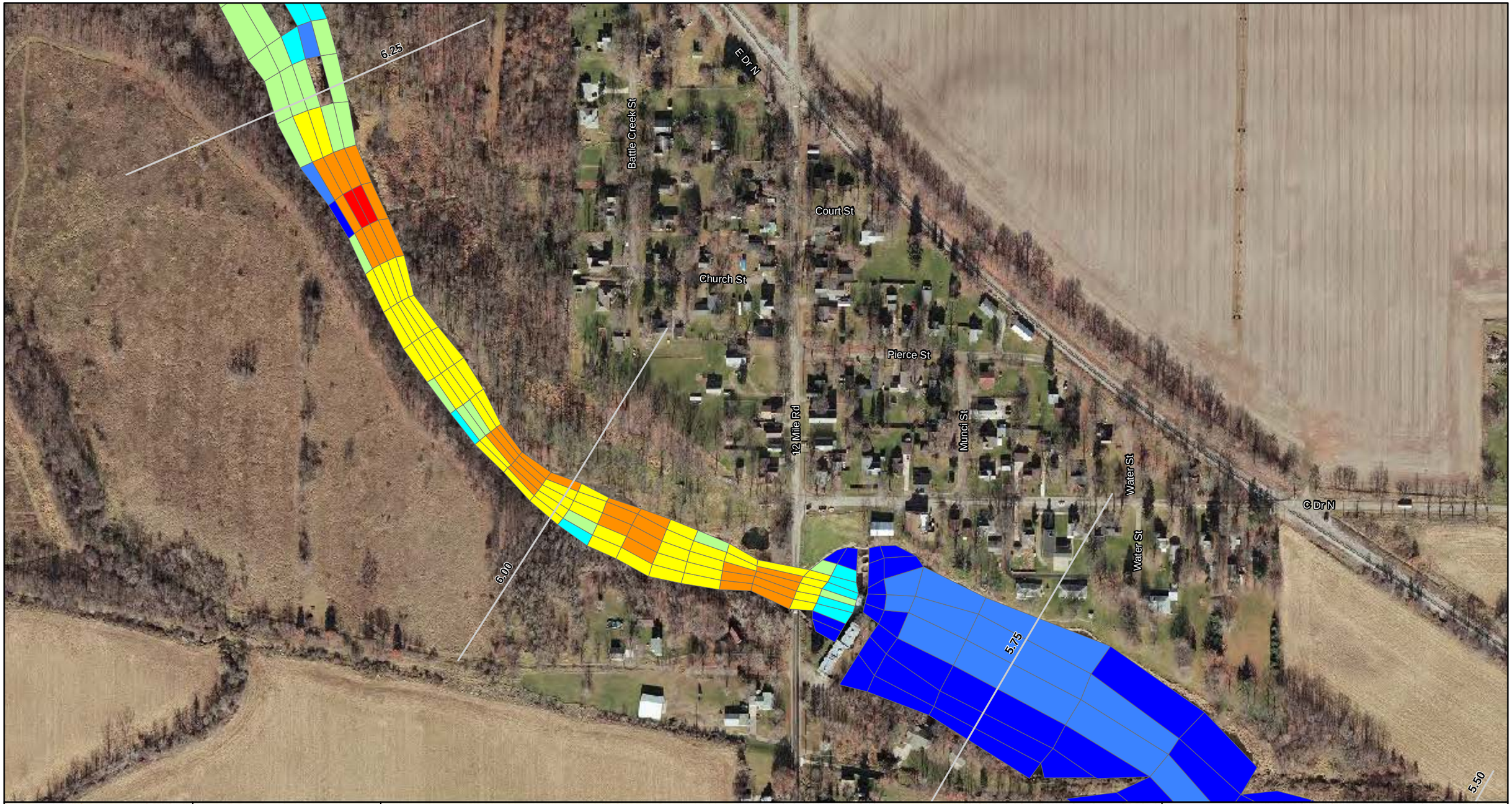
MP 04.90 - MP 05.65

SHEET 5 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May23_2011.mxd

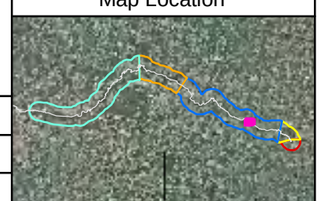
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

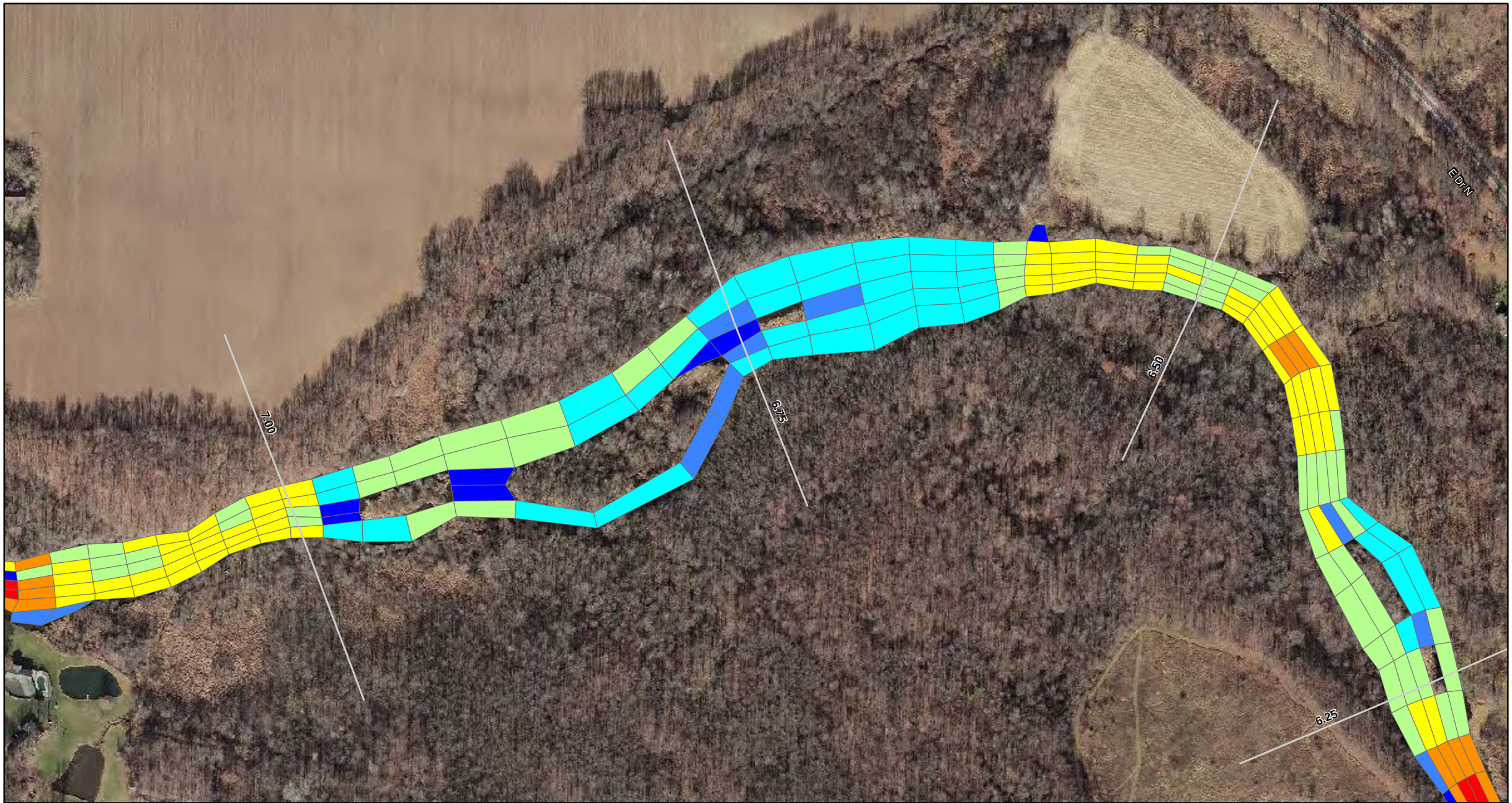
MP 05.65 - MP 06.30

SHEET 6 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE	
Drawn:	BRS 3/22/2012
Approved:	DBR 3/22/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals

cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

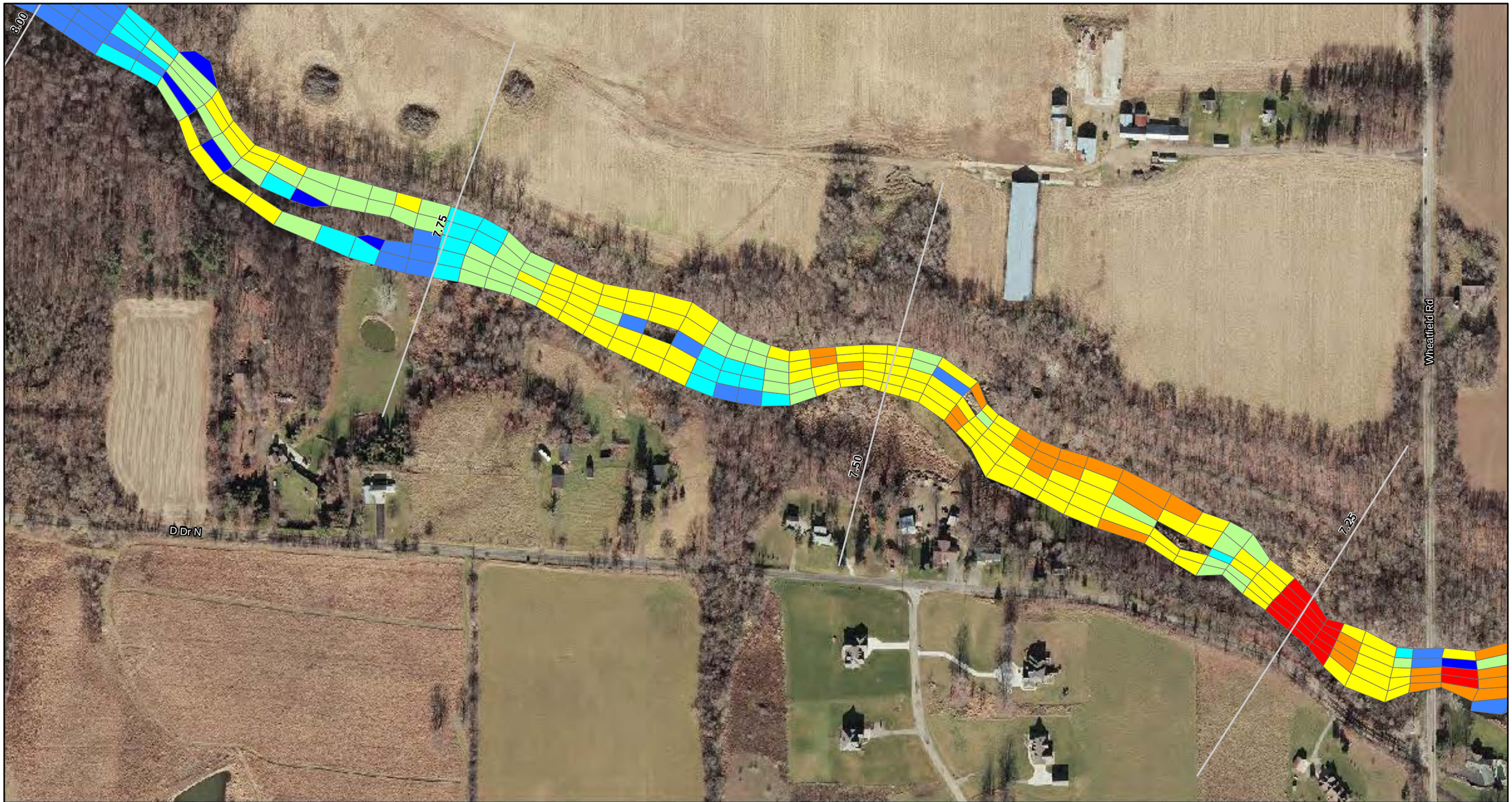
MP 06.20 - MP 07.15

SHEET 7 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



Drawn:	BRS 3/22/2012
Approved:	DBR 3/22/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

MP 07.15 - MP 07.95

SHEET 8 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

8.75

8.50

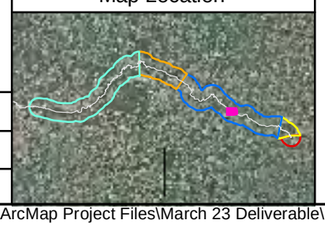
8.25

8.00

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

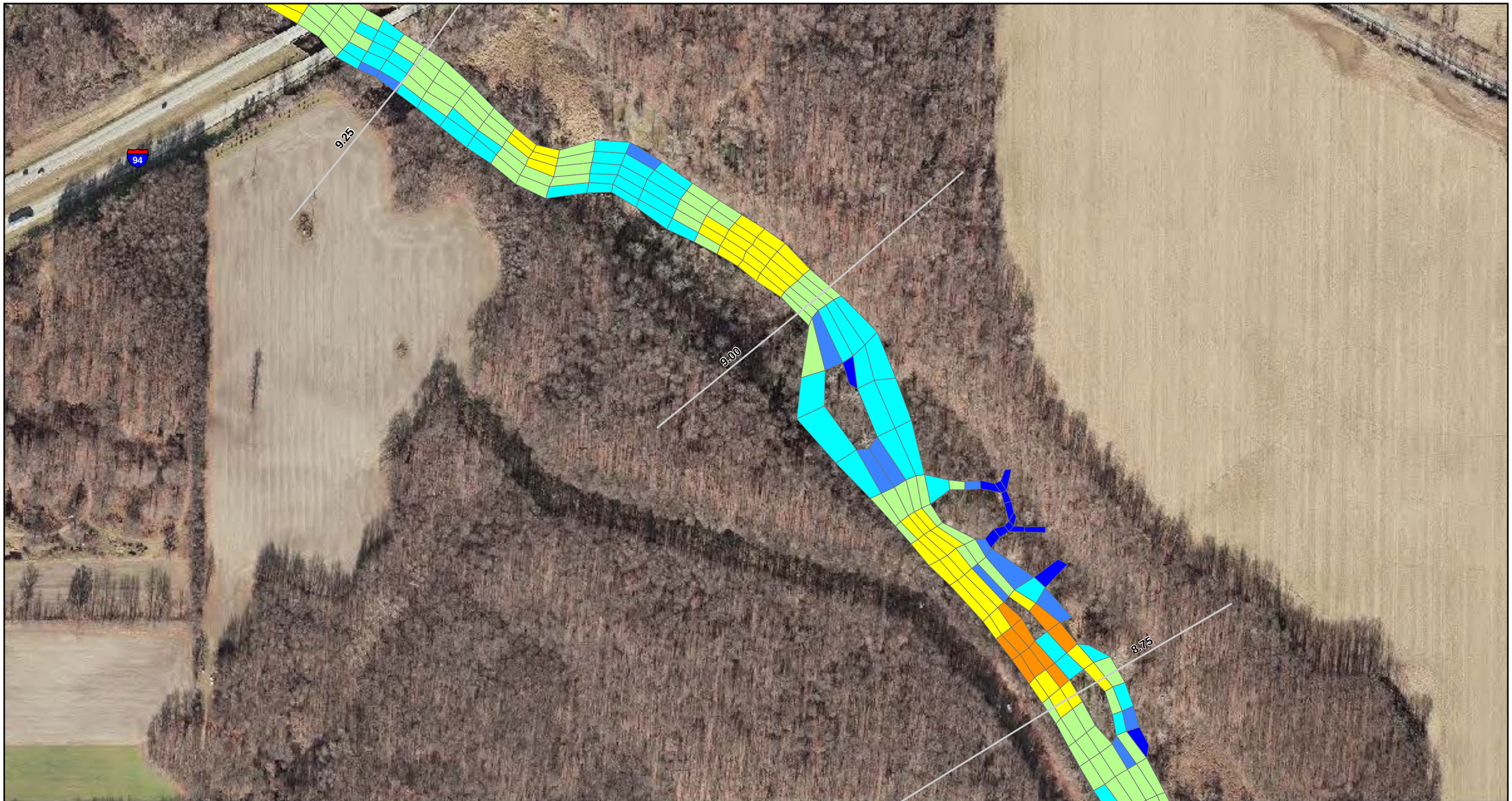
MP 07.90 - MP 08.75

SHEET 9 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

MP 08.70 - MP 09.30

SHEET 10 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

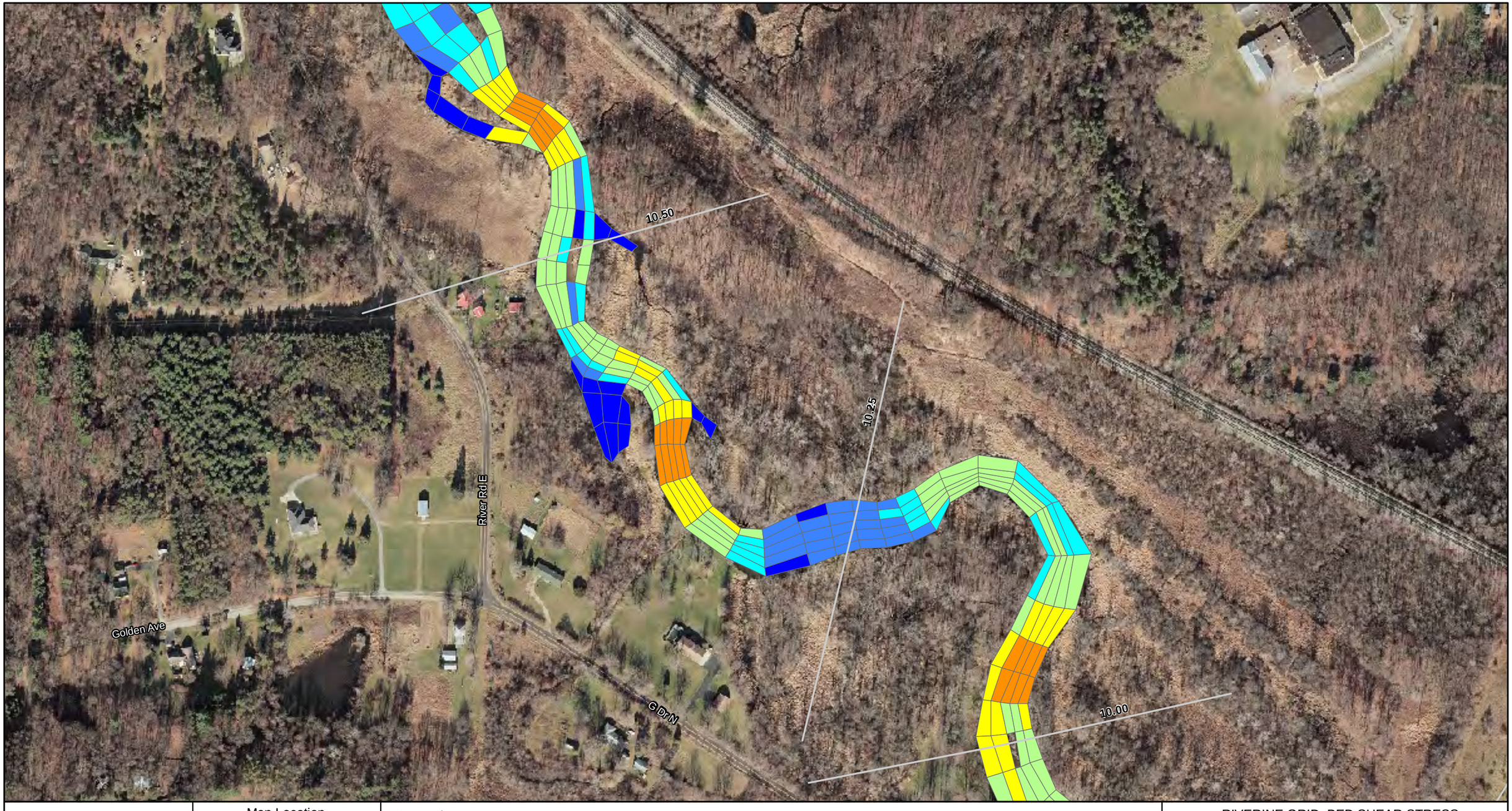
MP 09.25 - MP 10.05

SHEET 11 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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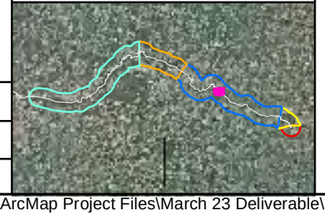
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

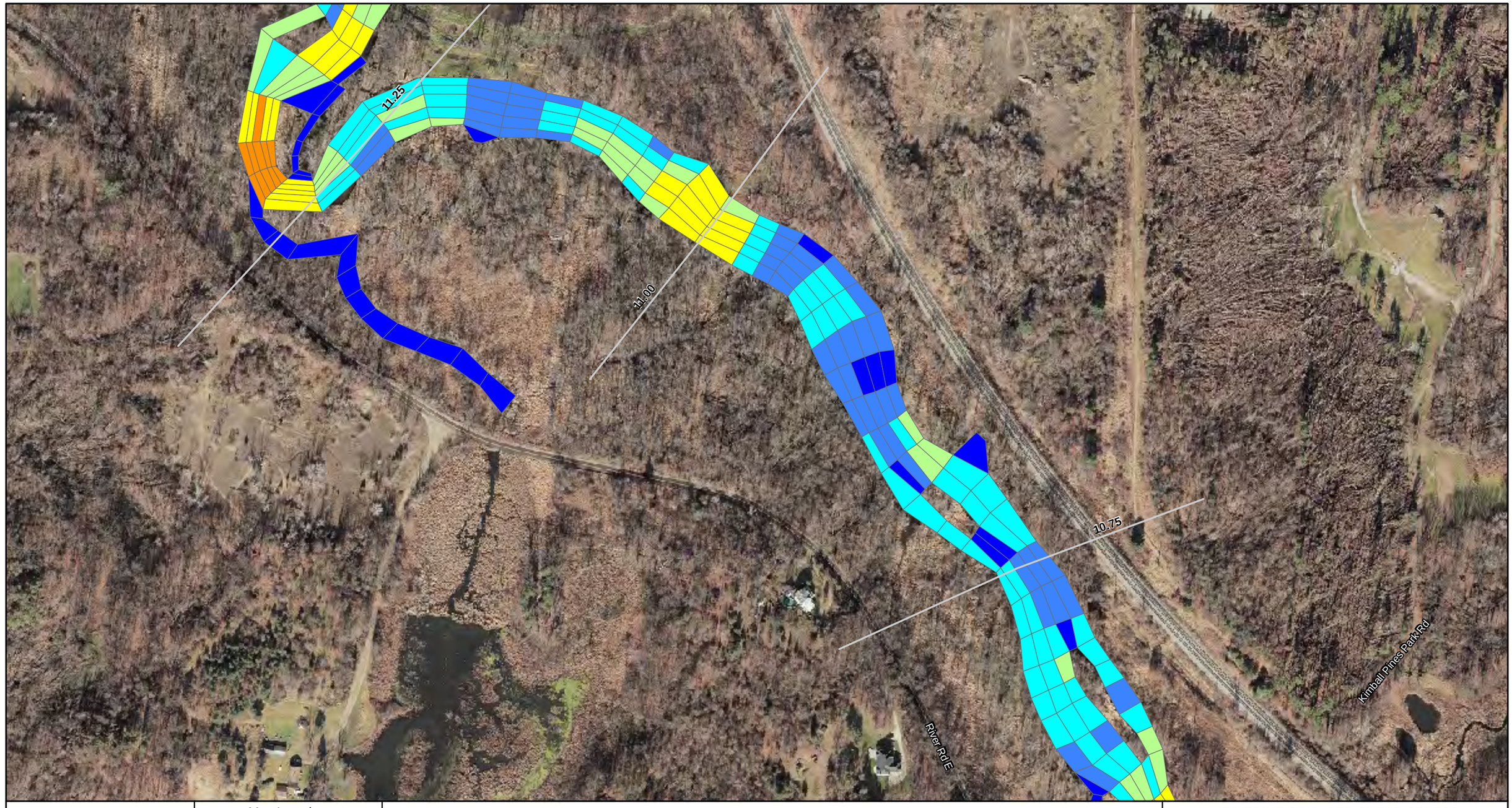
MP 10.00 - MP 10.65

SHEET 12 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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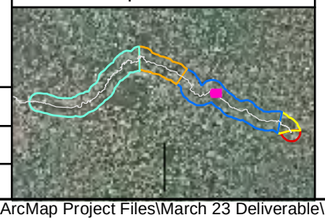
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

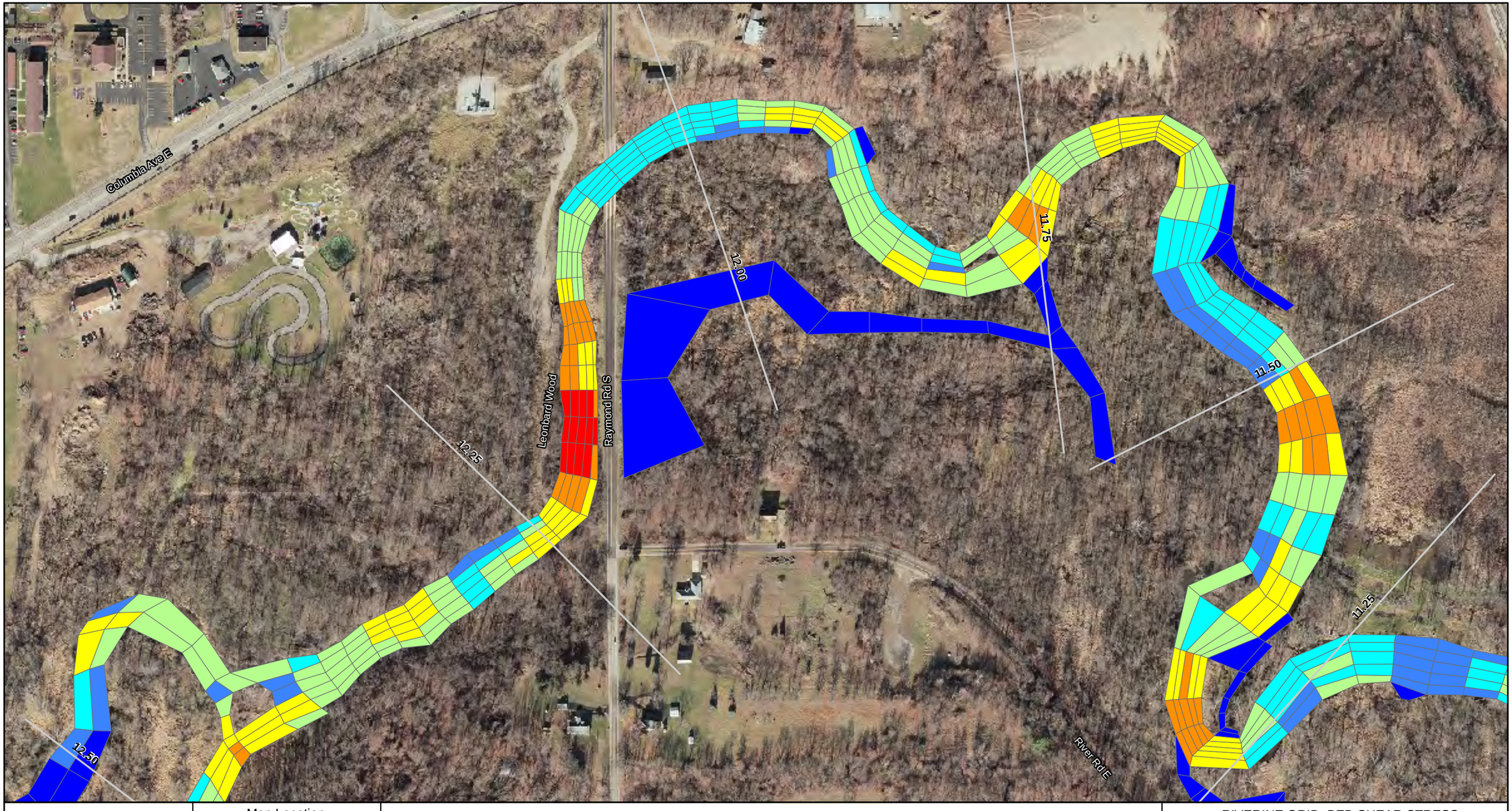
MP 10.60 - MP 11.40

SHEET 13 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May23_2011.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

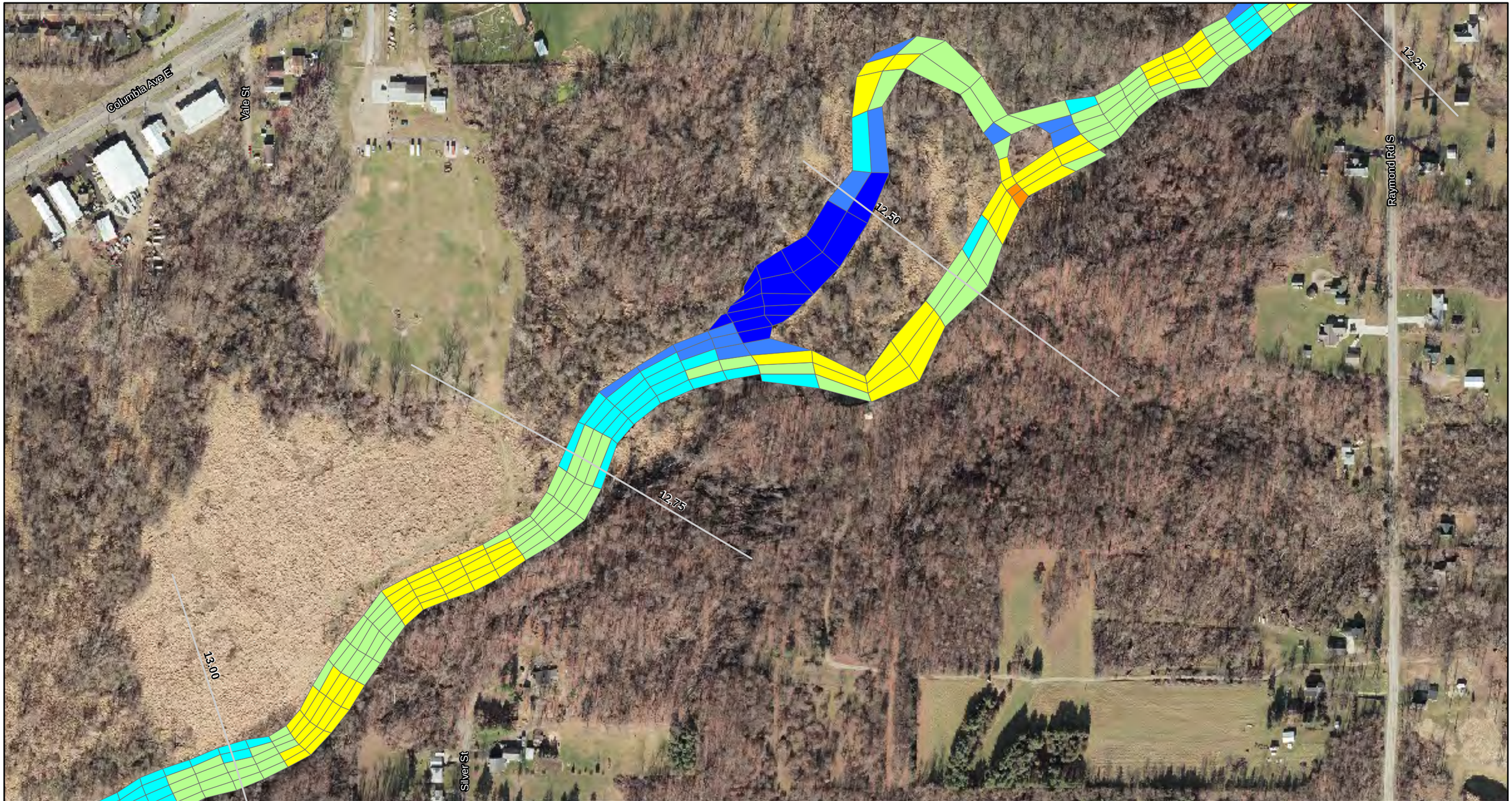
MP 11.10 - MP 12.45

SHEET 14 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May23_2011.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

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0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

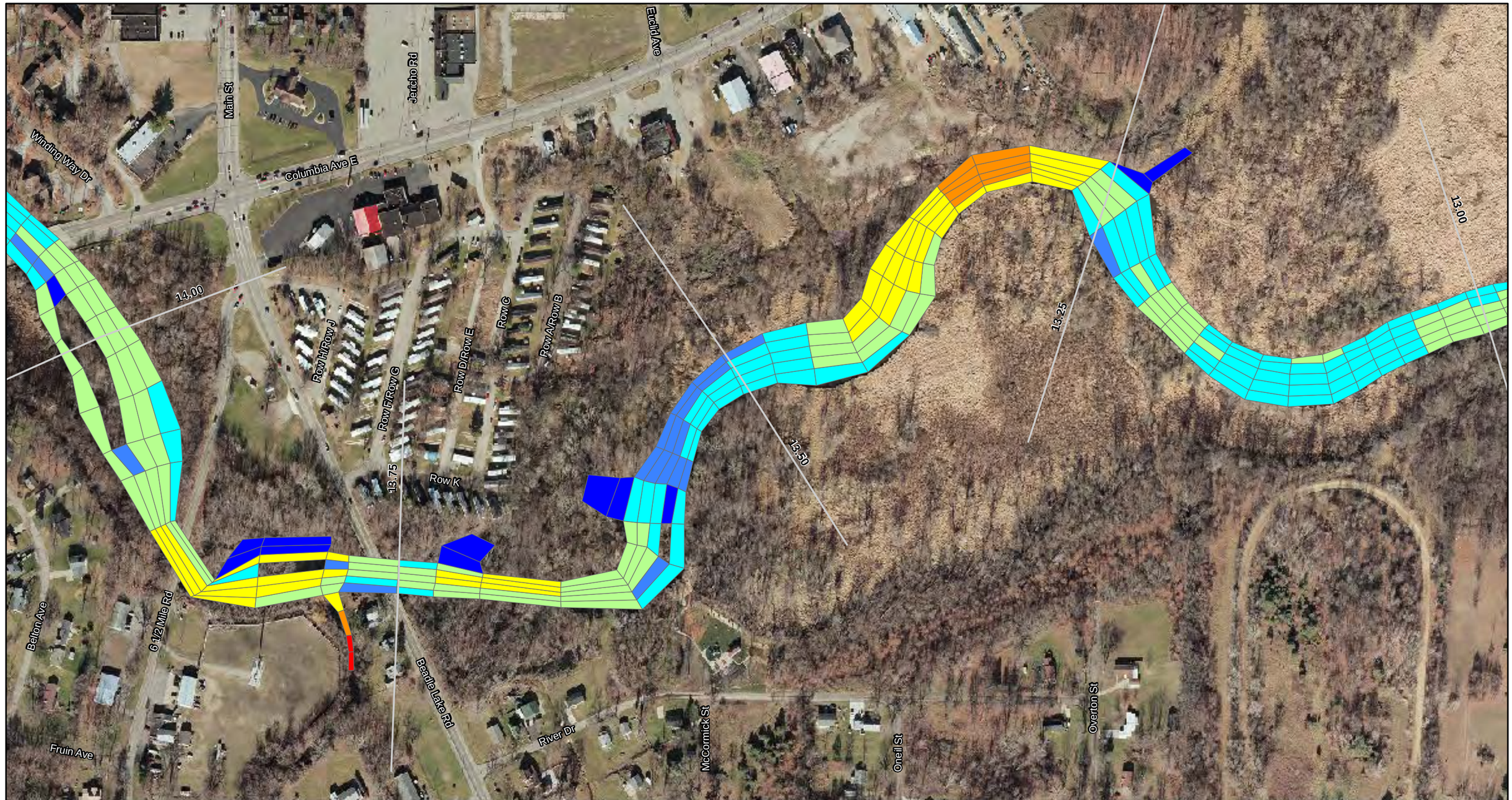
MP 12.30 - MP 13.05

SHEET 15 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

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Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

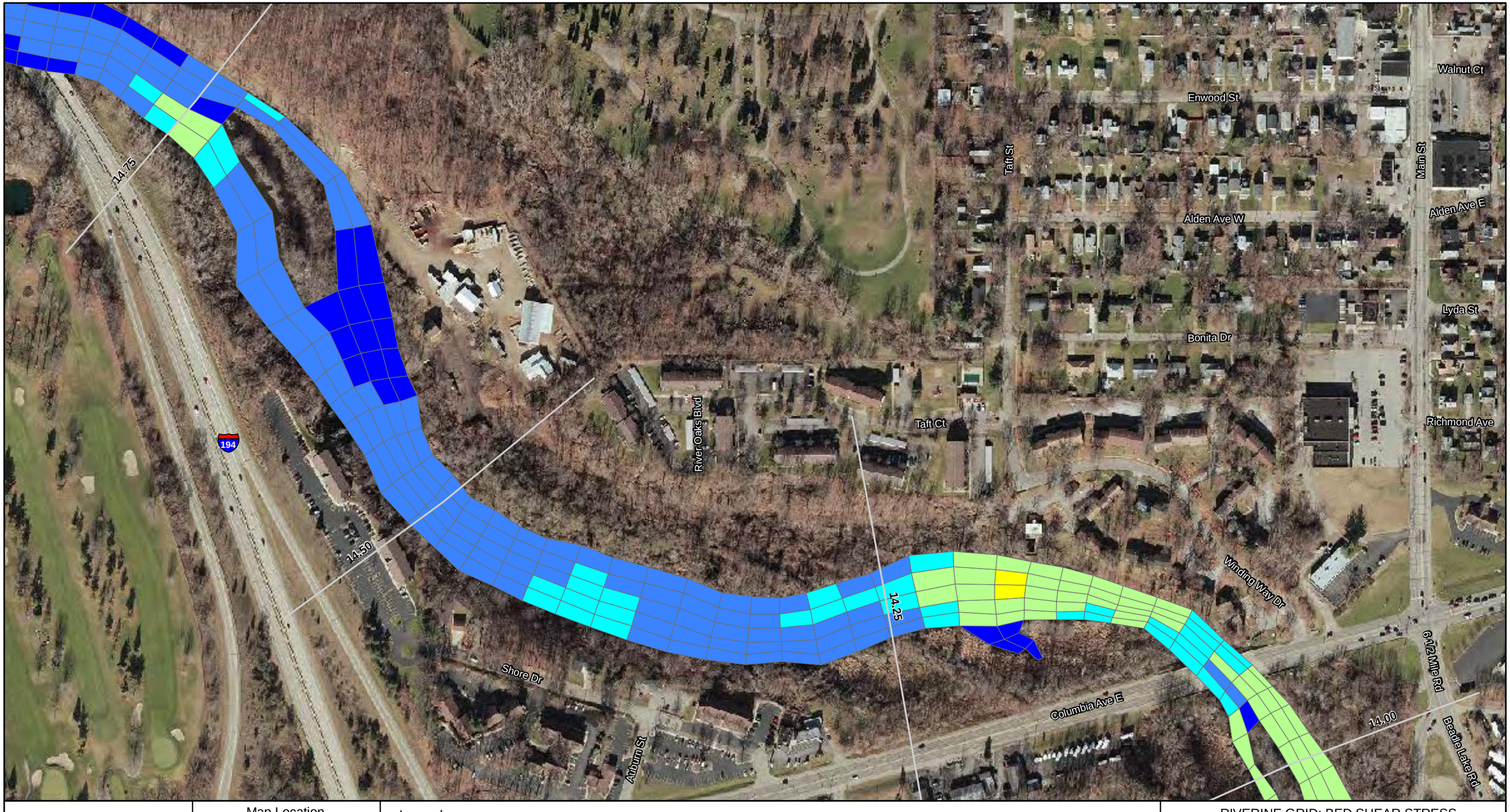
MP 13.00 - MP 14.10

SHEET 16 OF 56

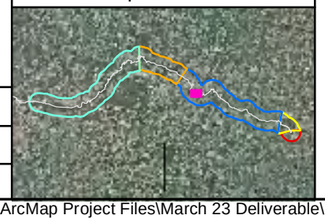
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



Map Location



ENBRIDGE

Drawn:	BRS	3/22/2012
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Legend

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Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

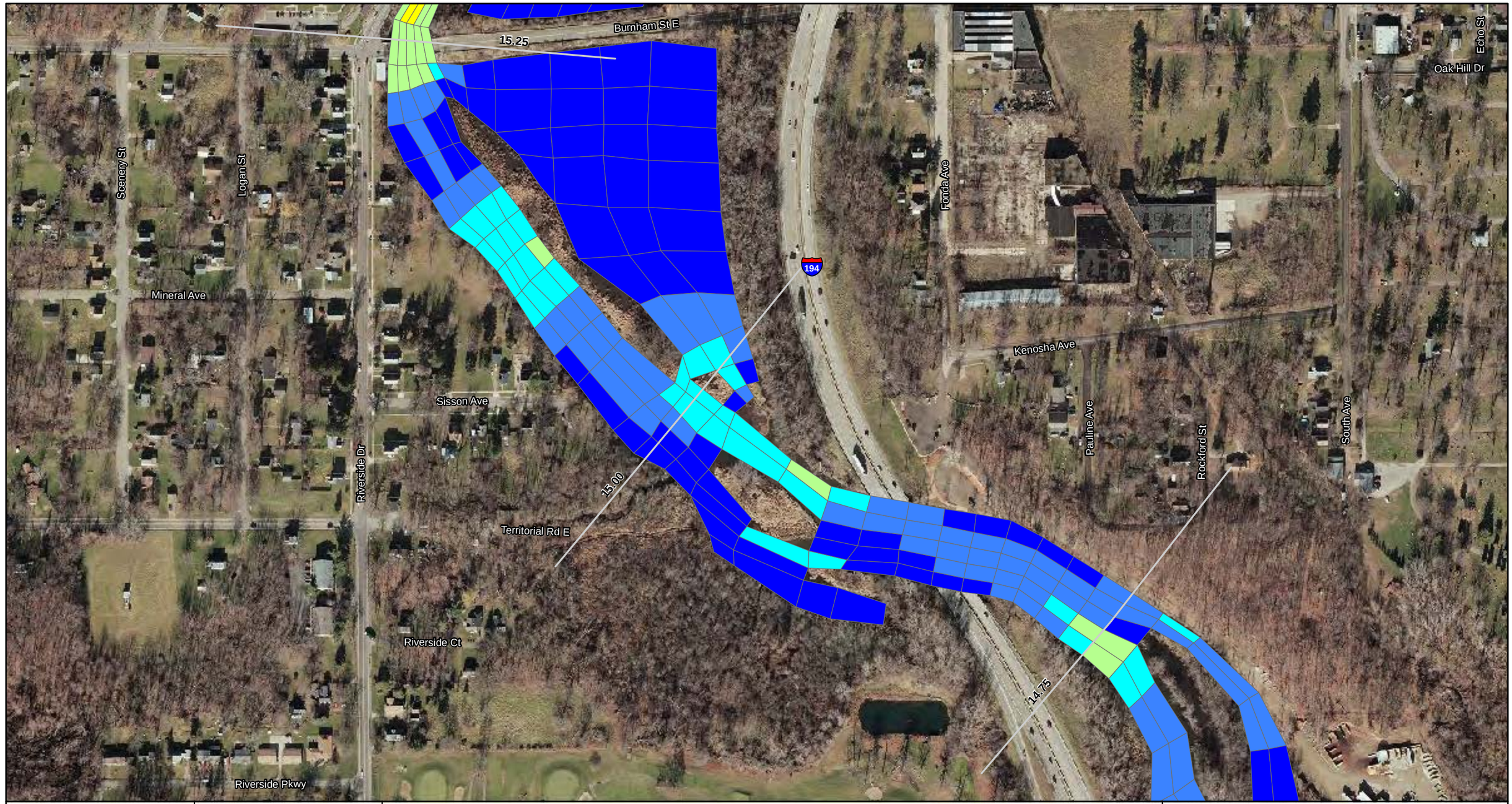
MP 14.00 - MP 14.85

SHEET 17 OF 56

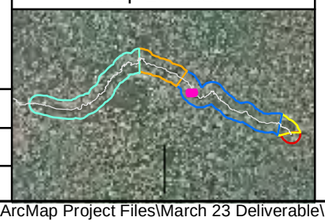
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

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Scale in Feet

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

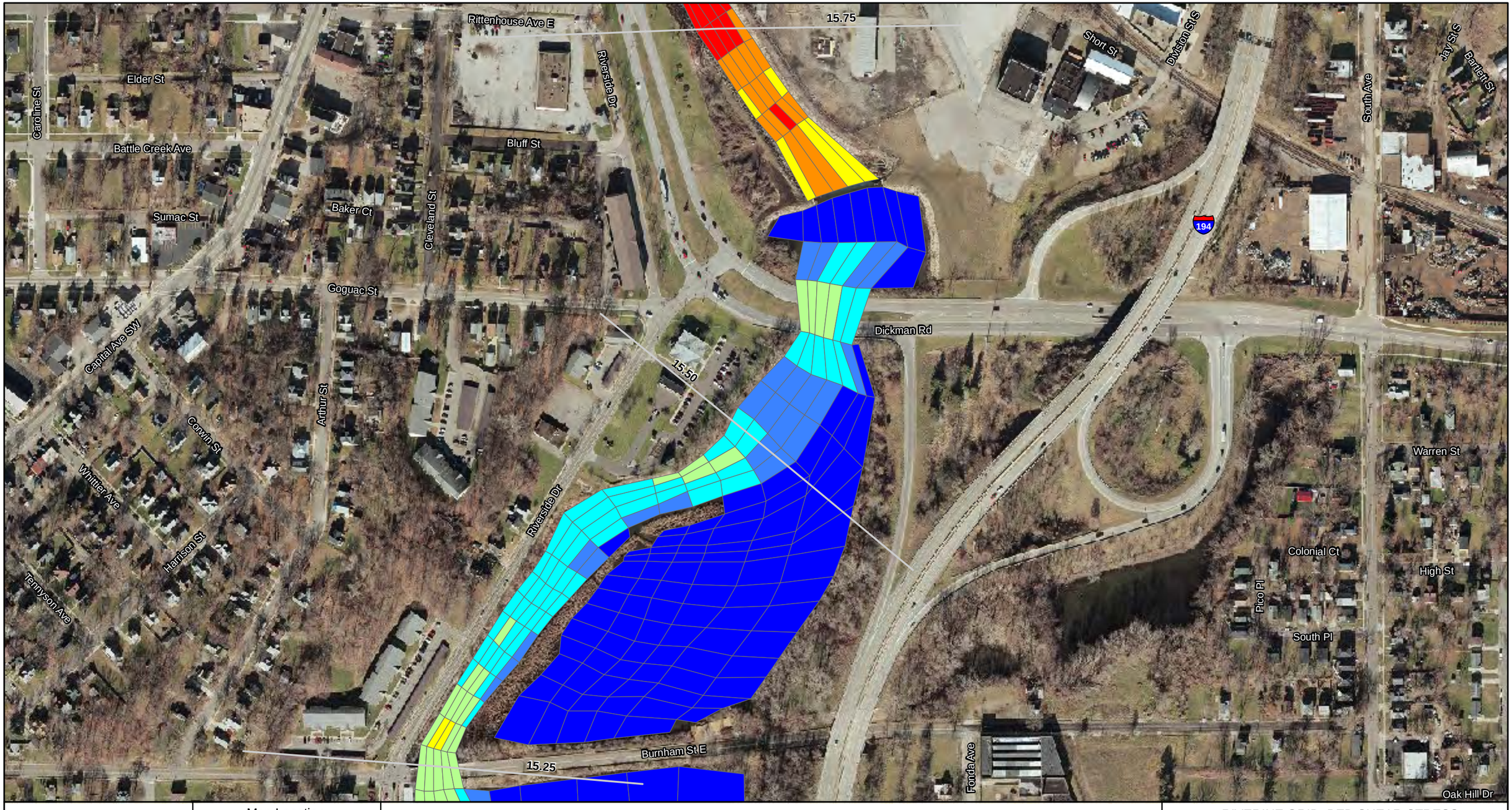
MP 14.65 - MP 15.25

SHEET 18 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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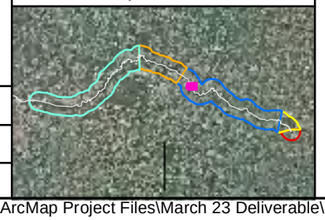
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
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Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

MP 15.25 - MP 15.75

SHEET 19 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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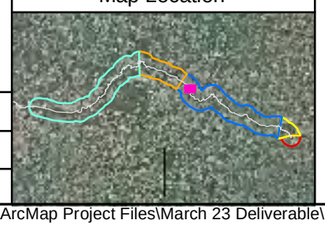
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
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Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

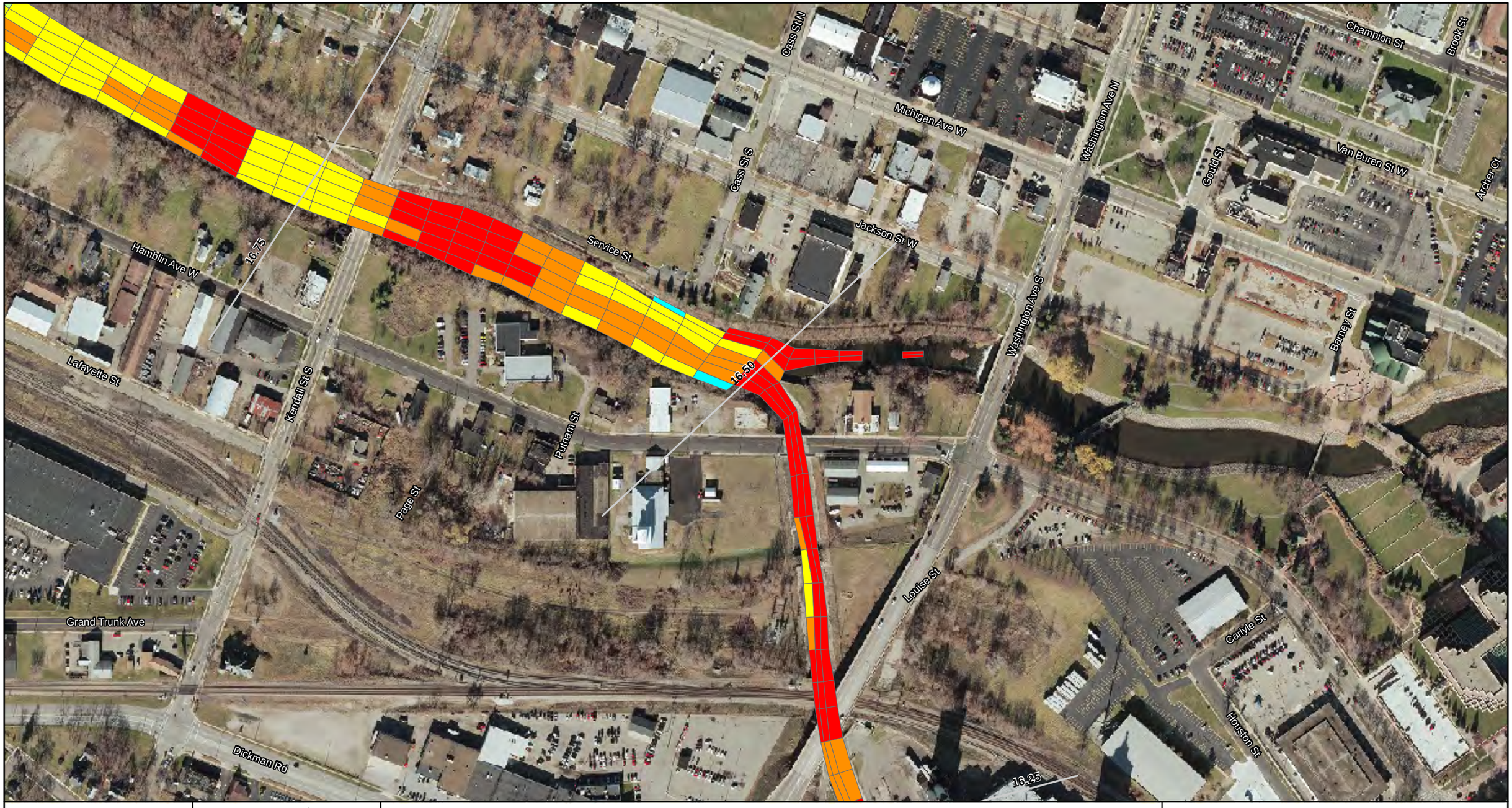
MP 15.75 - MP 16.30

SHEET 20 OF 56

ENBRIDGE LINE 6B MP 608
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ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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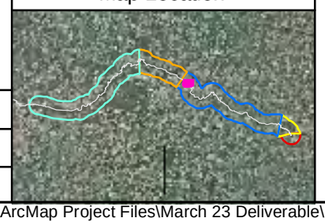
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
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Quarter Mile Grid Segment

Pa = Pascals
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

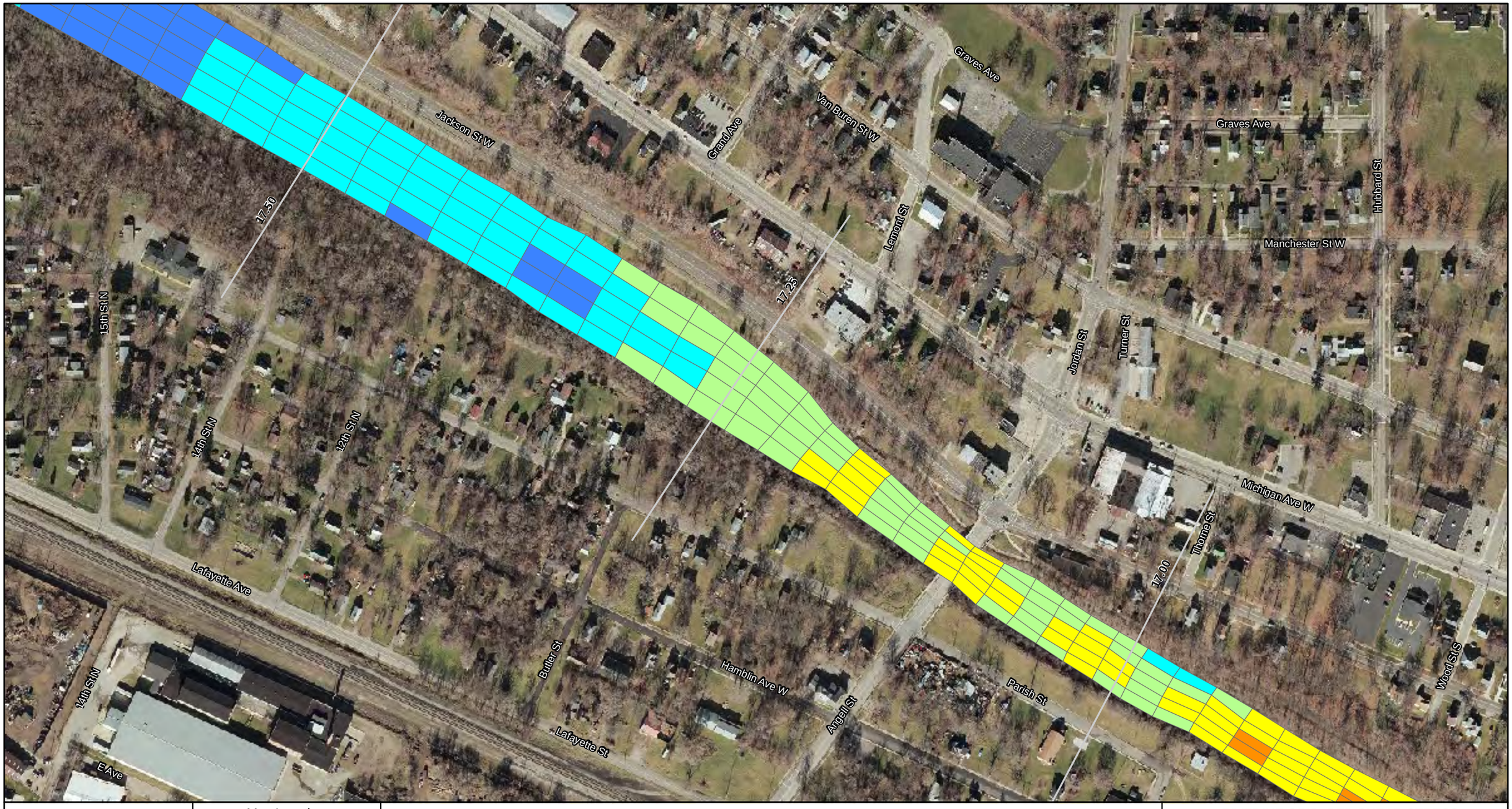
MP 16.30 - MP 16.95

SHEET 21 OF 56

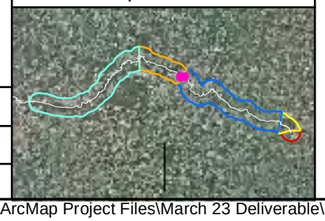
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
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X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May23_2011.mxd

Aerial Photography Date: November 2011



Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
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Quarter Mile Grid Segment

Pa = Pascals
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500
Scale in Feet

ENBRIDGE

Drawn:	BRS	3/22/2012
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Project #:	106-4186	

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

MP 16.85 - MP 17.60

SHEET 22 OF 56

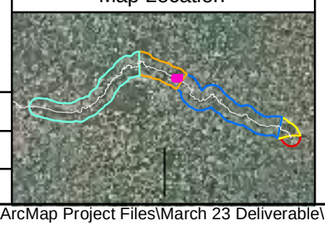
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



Map Location



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Legend

Bed Shear Stress (Pa), May 23, 2011

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Quarter Mile Grid Segment

Pa = Pascals
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

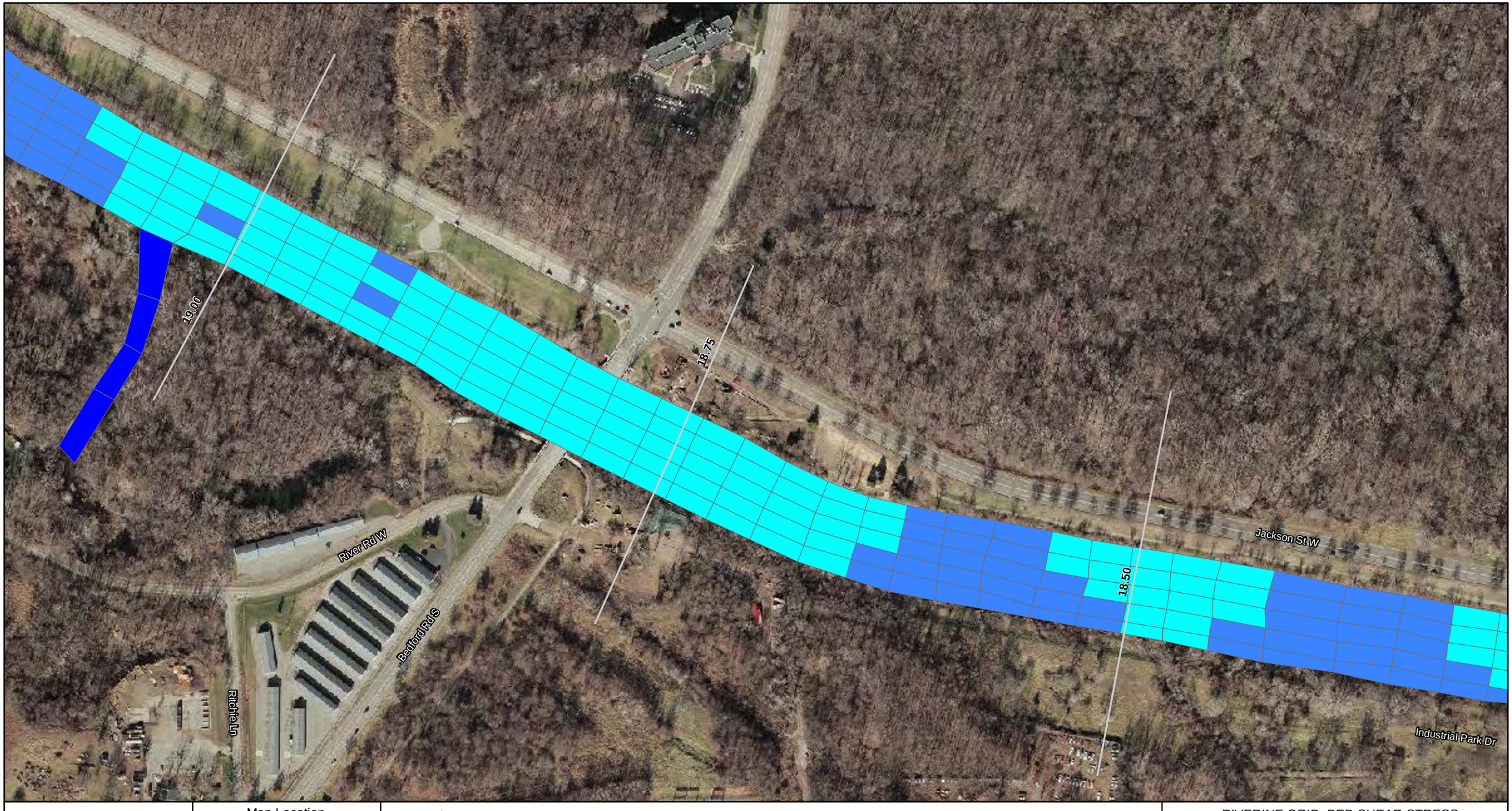
MP 17.60 - MP 18.40

SHEET 23 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

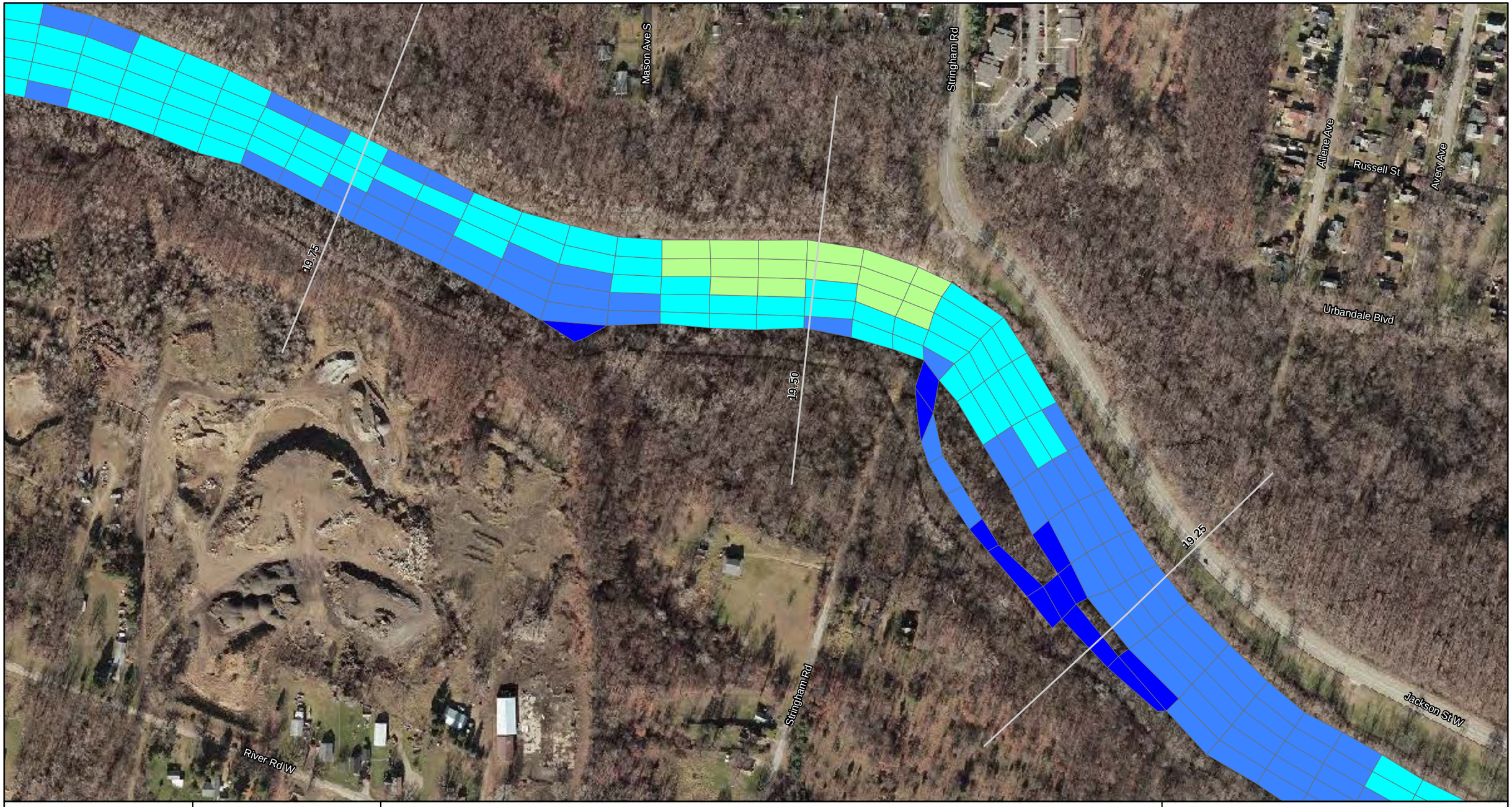
MP 18.30 - MP 19.15

SHEET 24 OF 56

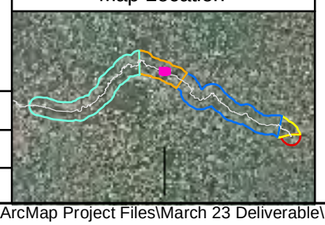
ENBRIDGE LINE 6B MP 608
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Aerial Photography Date: November 2011



Map Location



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ENBRIDGE

Drawn:	BRS	3/22/2012
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Project #:	106-4186	

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

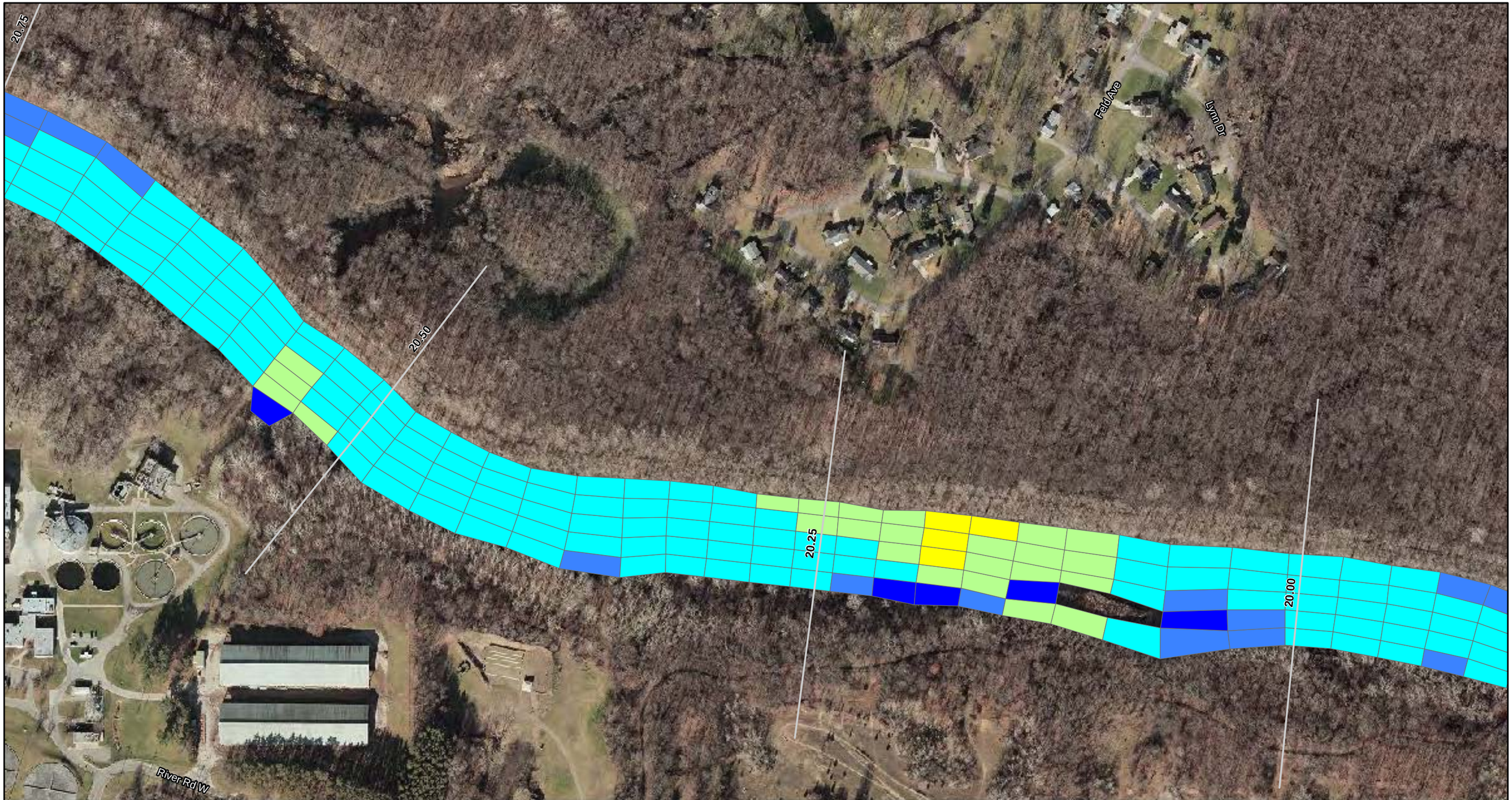
MP 19.10 - MP 19.95

SHEET 25 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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ENBRIDGE

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Project #:	106-4186	

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Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

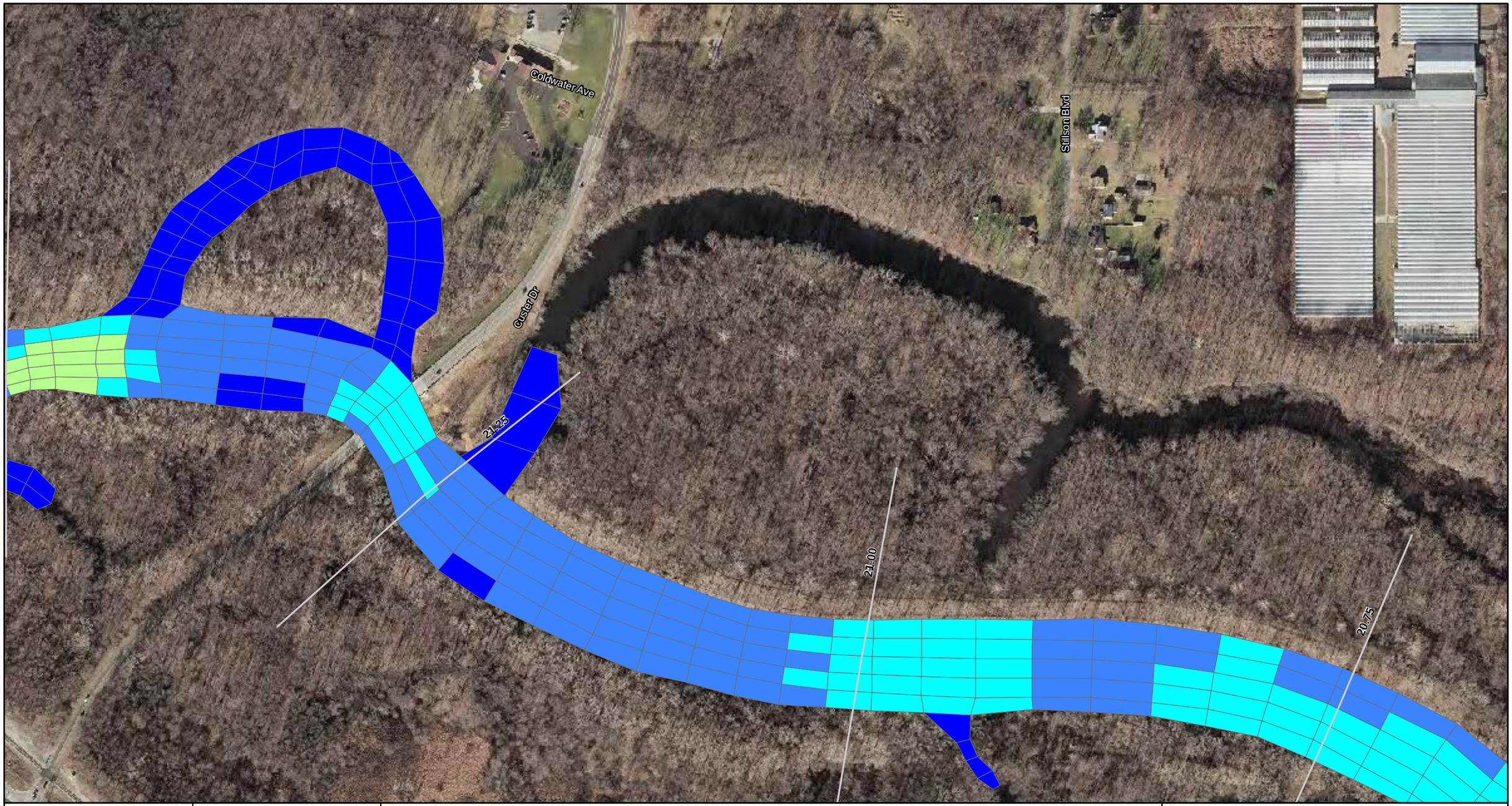
MP 19.90 - MP 20.75

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ENBRIDGE LINE 6B MP 608
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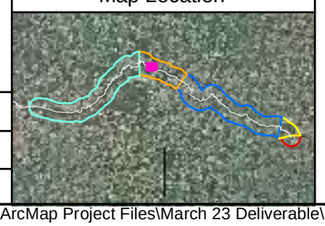
Aerial Photography Date: November 2011



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Map Location



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Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

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Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

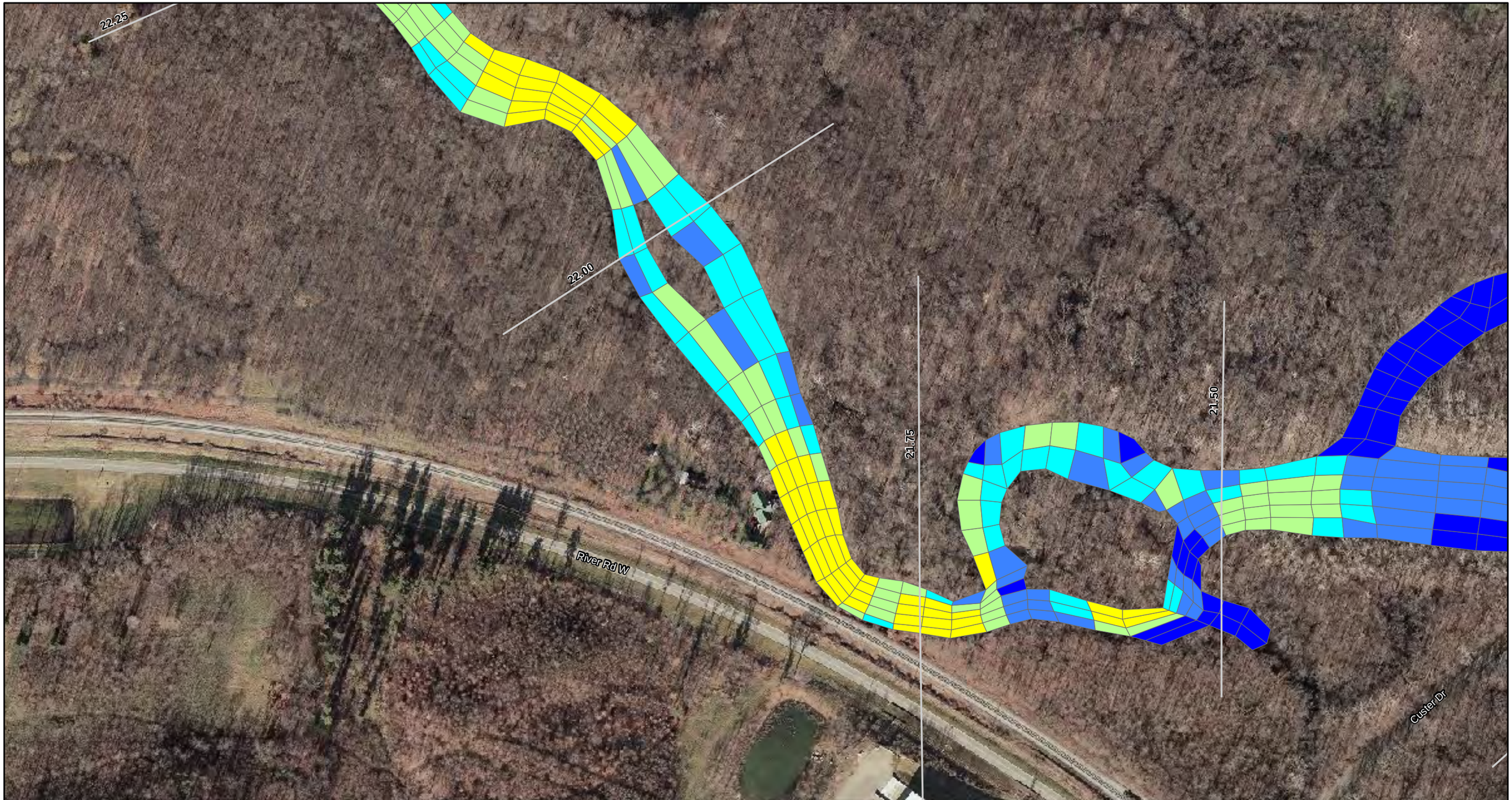
MP 20.70 - MP 21.50

SHEET 27 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
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Drawn:	BRS 3/22/2012
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Map Location



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Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

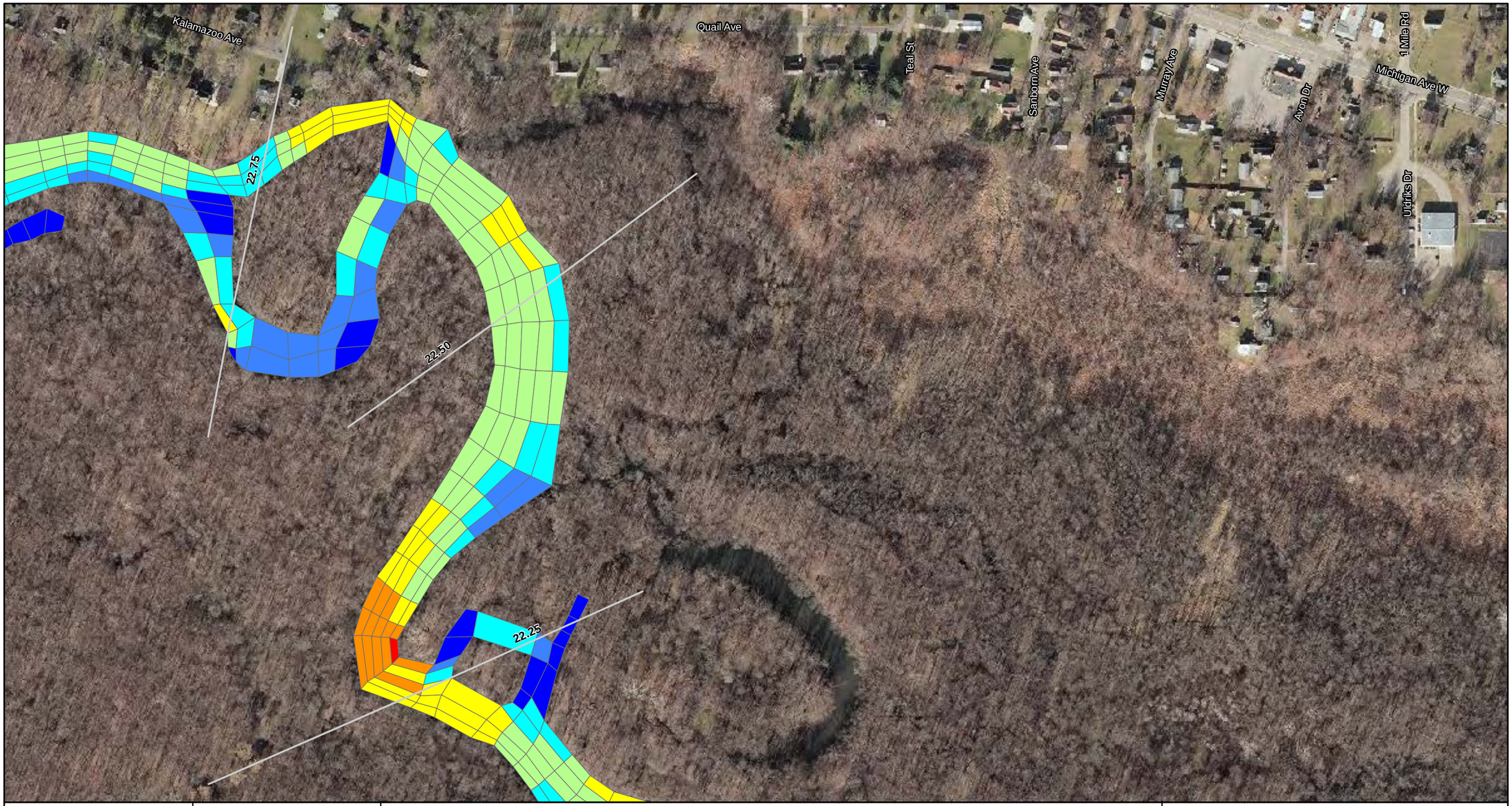
MP 21.35 - MP 22.15

SHEET 28 OF 56

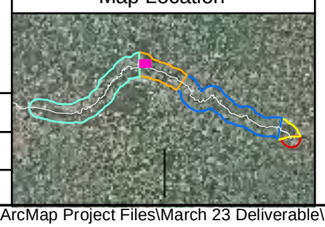
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

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Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

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Scale in Feet

ENBRIDGE

Drawn:	BRS	3/22/2012
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Project #:	106-4186	

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

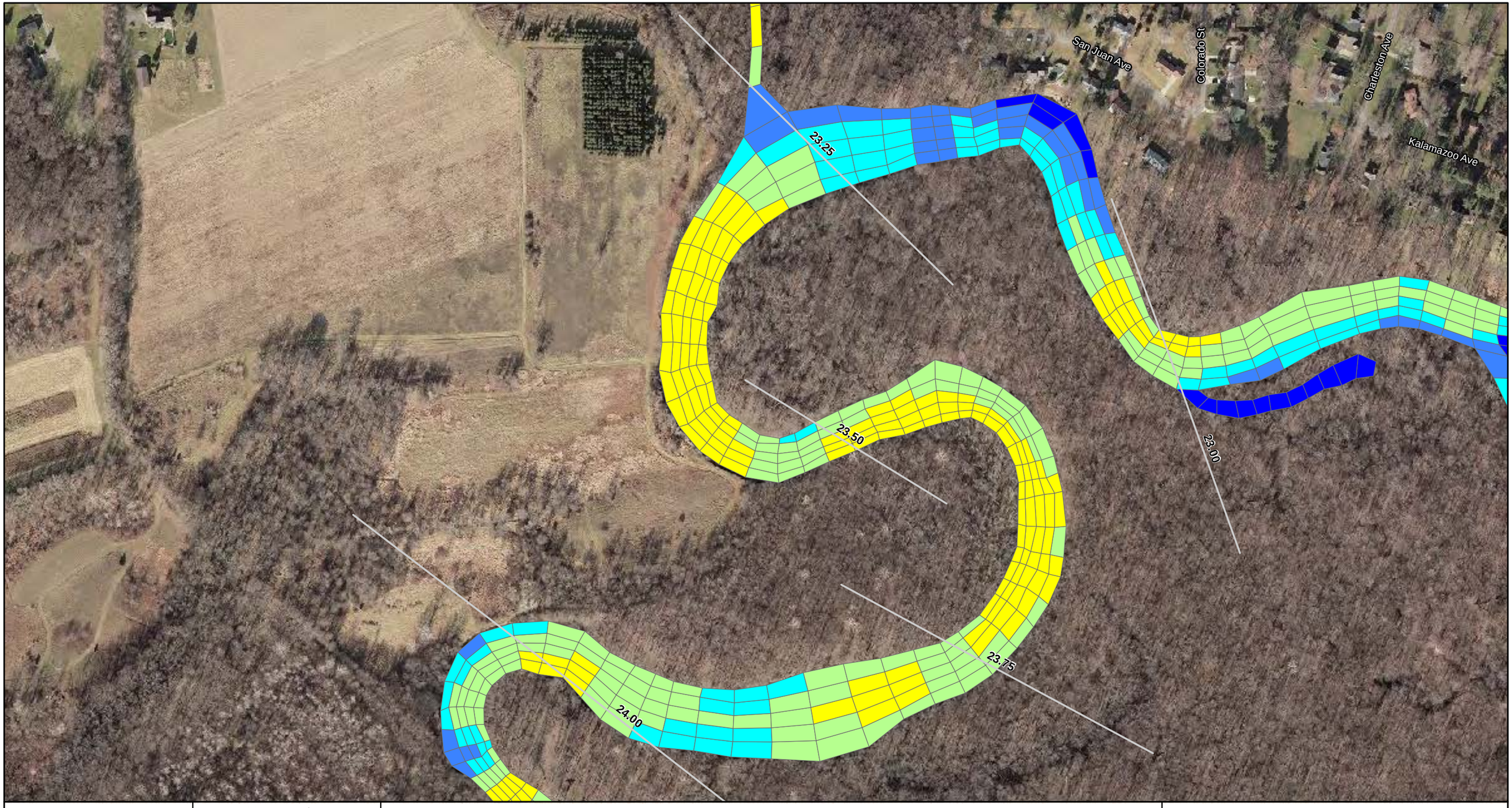
MP 22.15 - MP 22.90

SHEET 29 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May23_2011.mxd

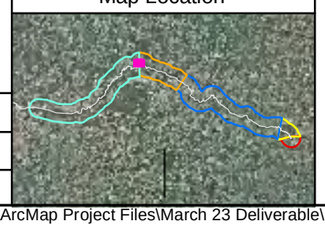
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

MP 22.80 - MP 24.10

SHEET 30 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May23_2011.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

MP 24.10 - MP 24.85

SHEET 31 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May23_2011.mxd

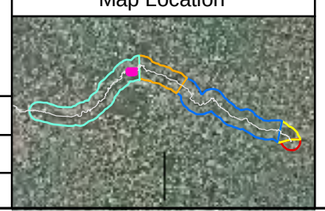
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

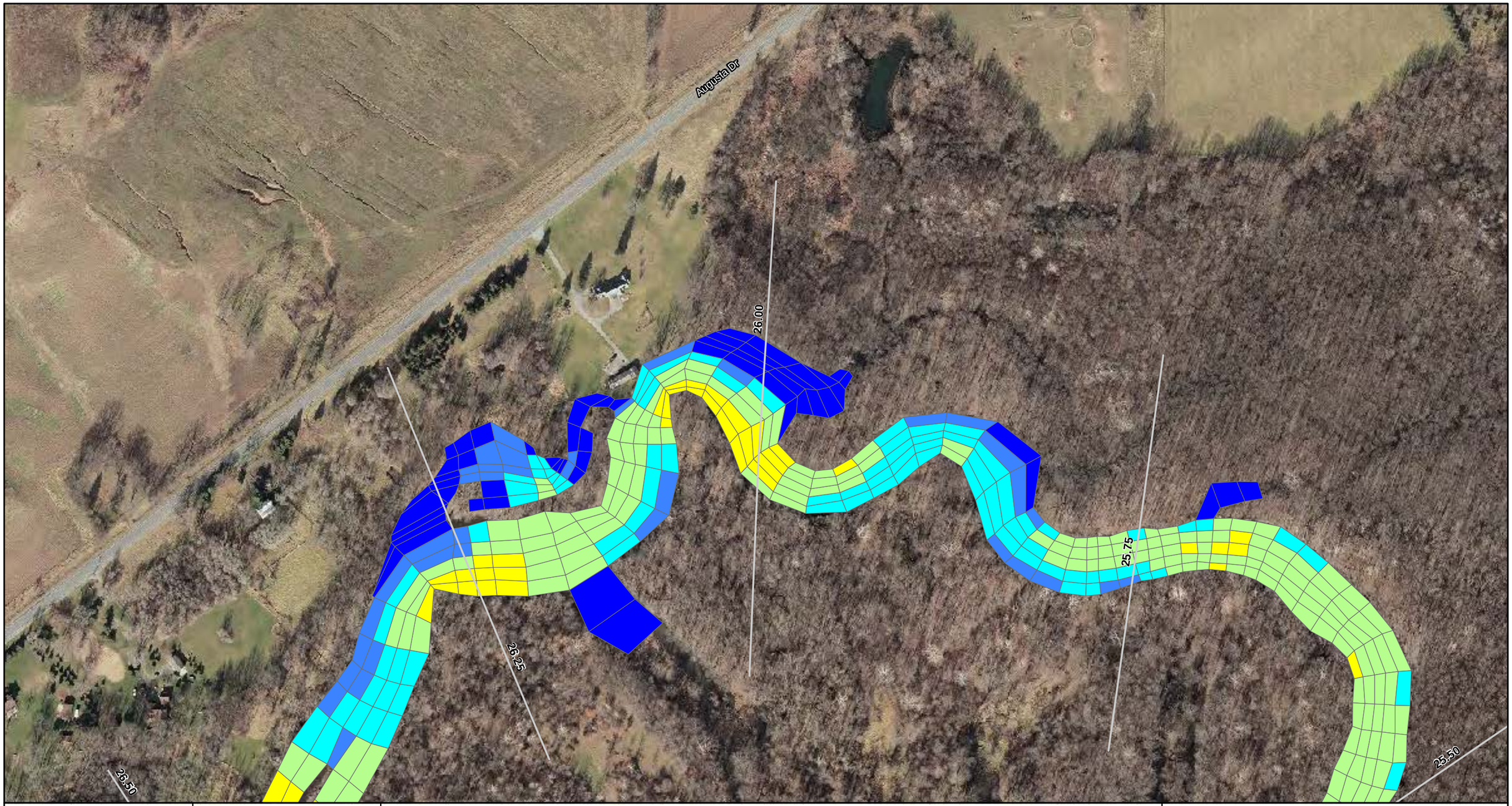
MP 24.80 - MP 25.65

SHEET 32 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May23_2011.mxd

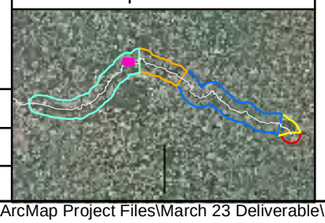
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
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- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

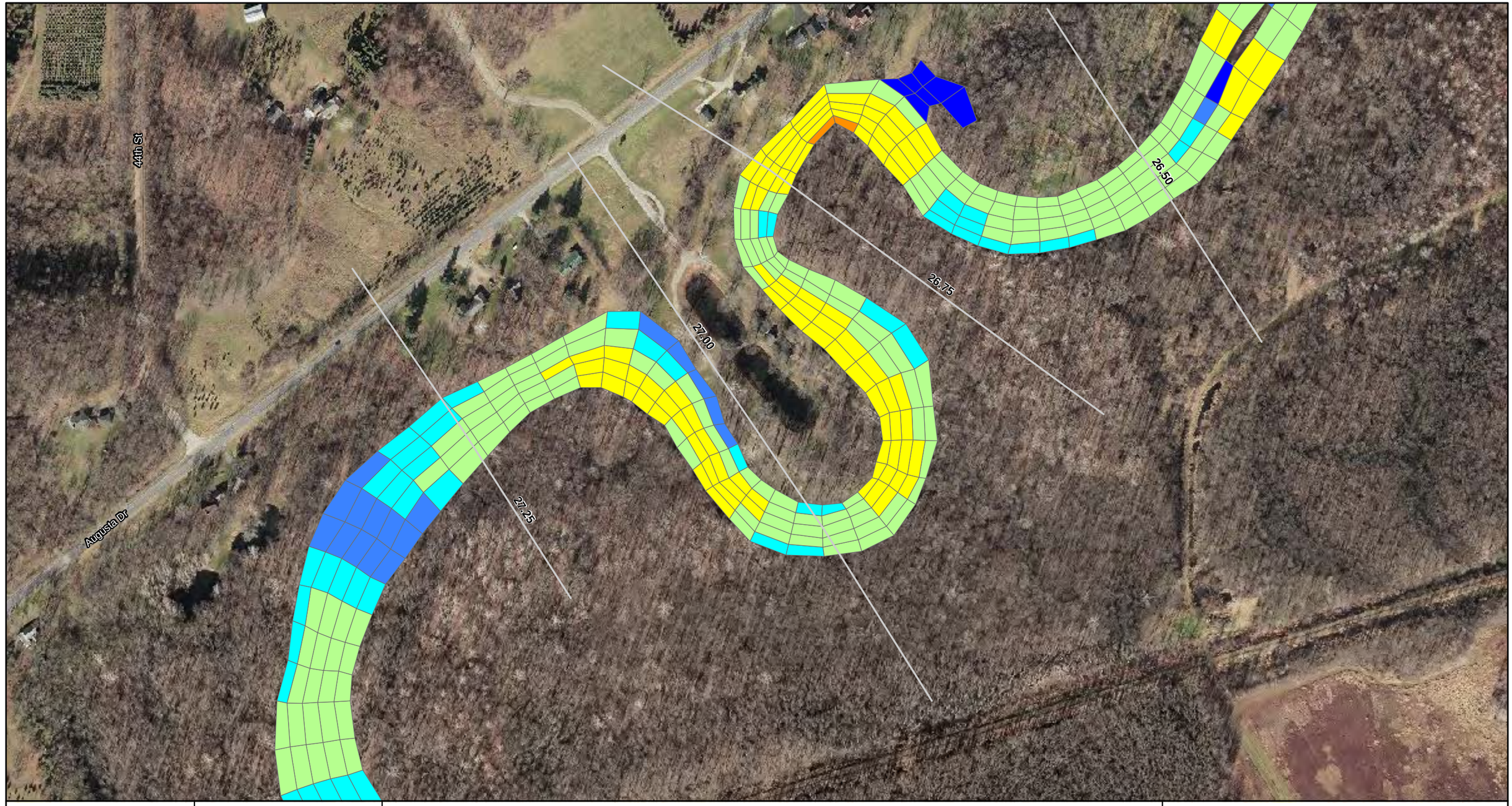
MP 25.55 - MP 26.40

SHEET 33 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

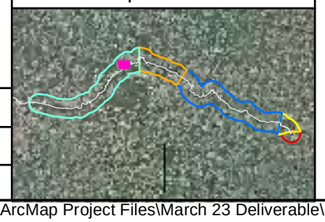
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May23_2011.mxd

Aerial Photography Date: November 2011



Drawn:	BRS 3/22/2012
Approved:	DBR 3/22/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

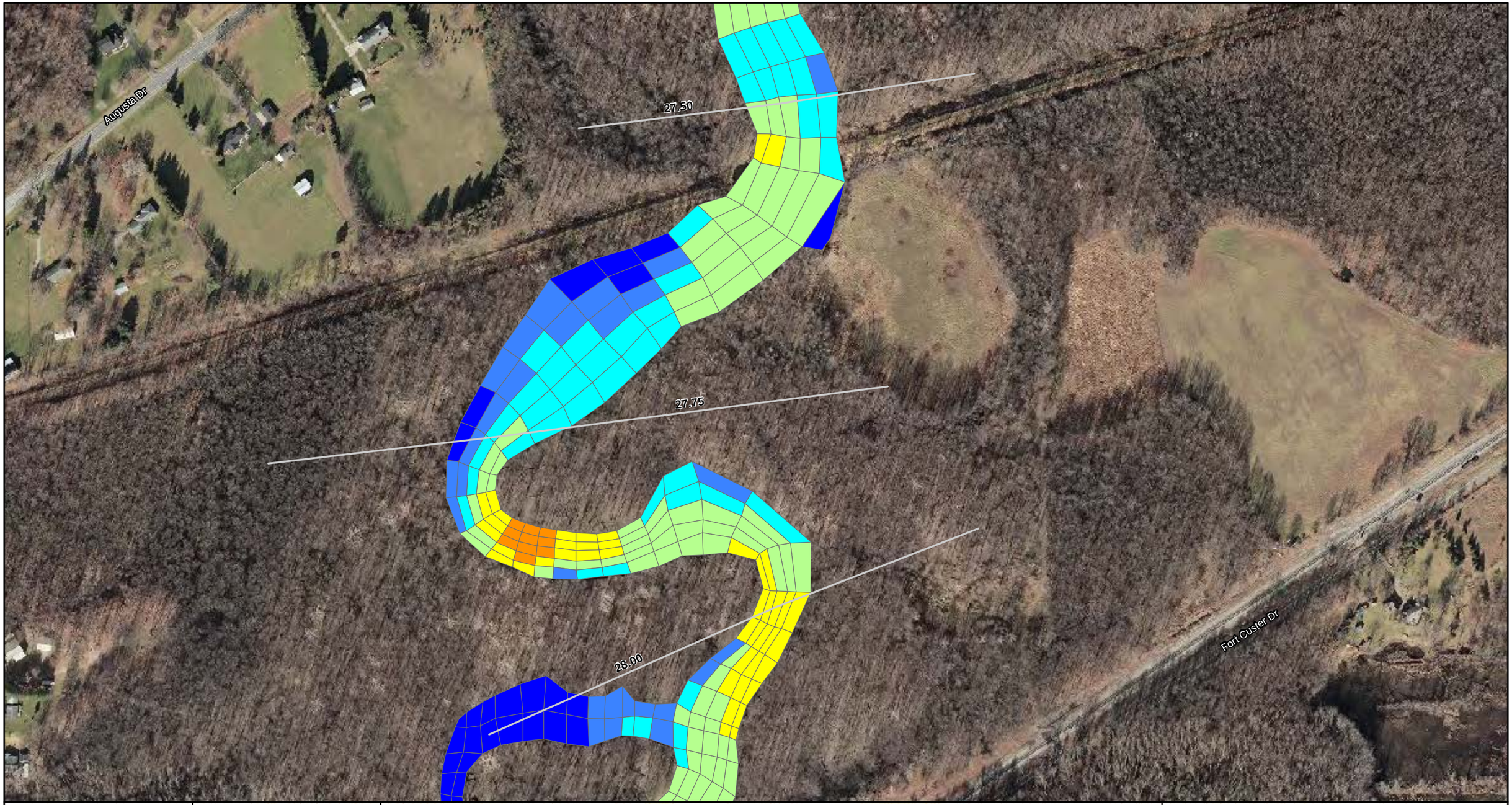
MP 26.40 - MP 27.45

SHEET 34 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May23_2011.mxd

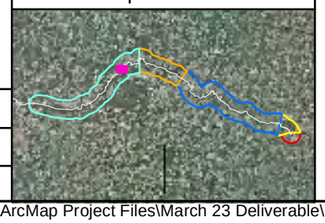
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

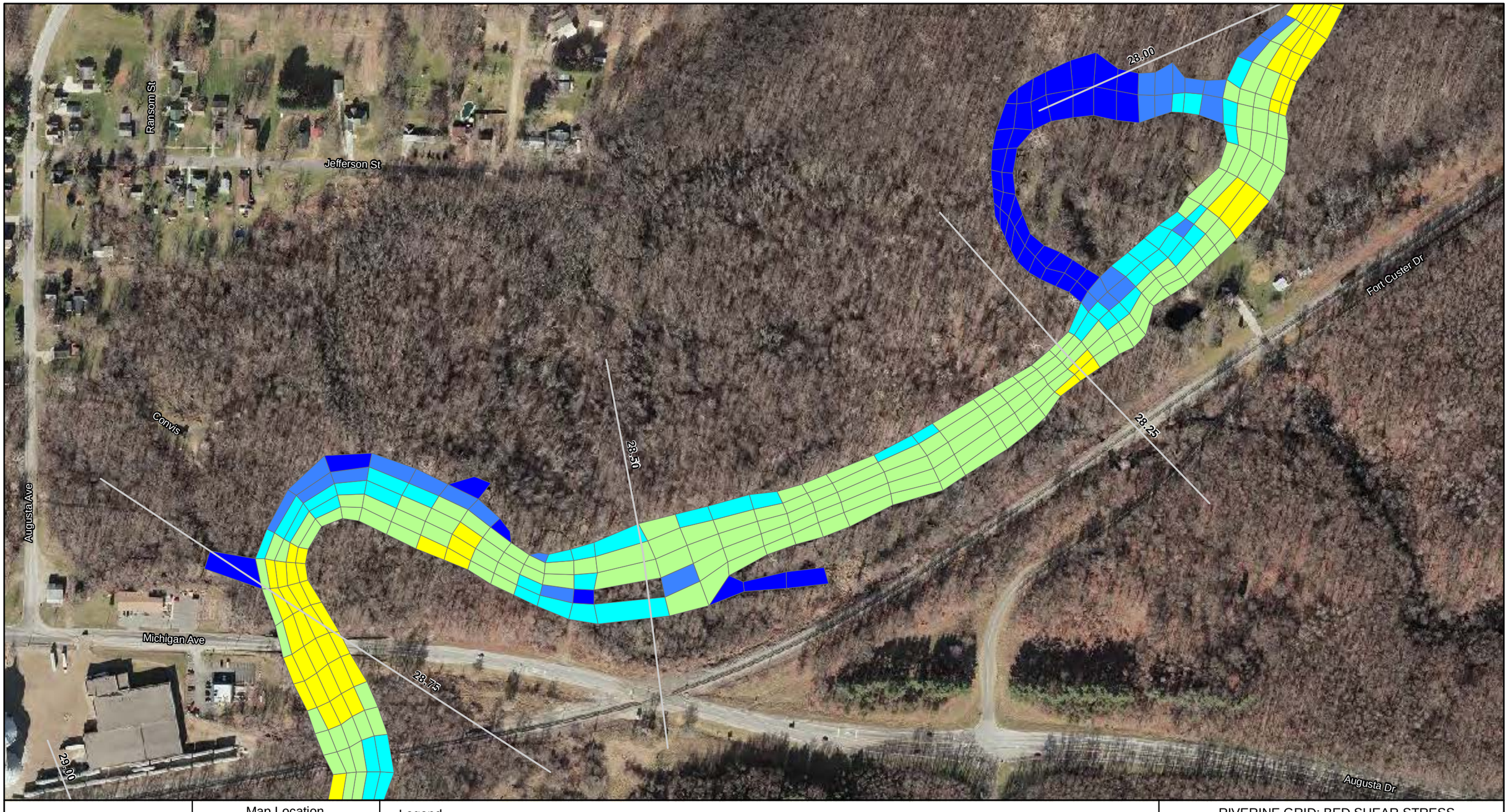
MP 27.45 - MP 28.10

SHEET 35 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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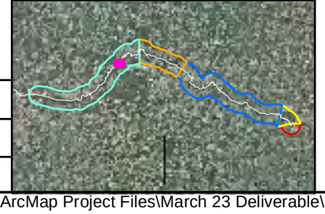
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

MP 28.05 - MP 28.85

SHEET 36 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

MP 28.85 - MP29.55

SHEET 37 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

29.50

29.75

Fort Custer Rec Area Service

Fort Custer Rec Area Access

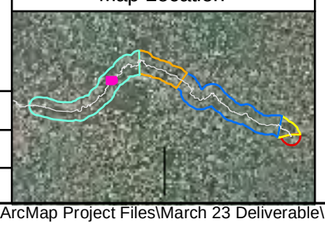
30.25

30.00

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

MP 29.50 - MP29.95

SHEET 38 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

MP 29.95 - MP 30.80

SHEET 39 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May23_2011.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

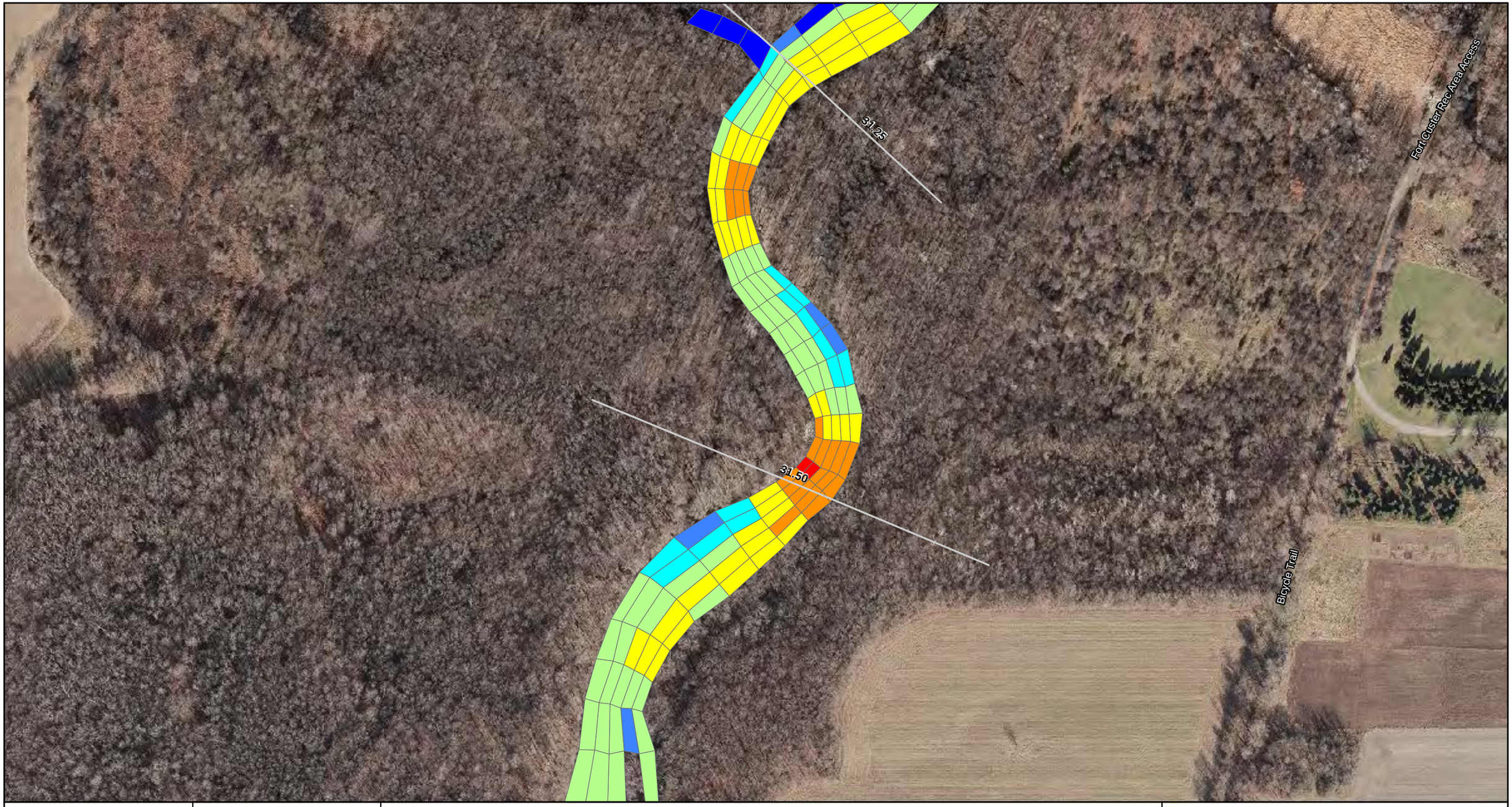
MP 30.75 - MP 31.25

SHEET 40 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May23_2011.mxd

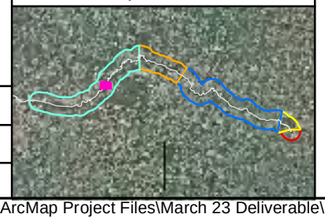
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

MP 31.25 - MP 31.70

SHEET 41 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May23_2011.mxd

Aerial Photography Date: November 2011

31.75

32.00

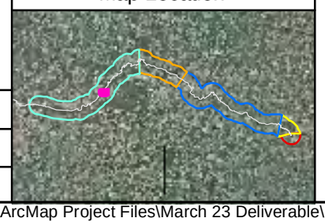
32.25

Bicycle Trail

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

MP 31.65 - MP 32.25

SHEET 42 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May23_2011.mxd

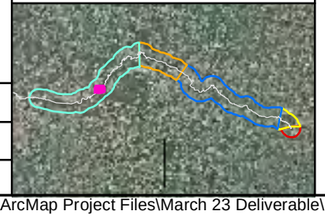
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

MP 32.25 - MP 33.10

SHEET 43 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

33.00

33.25

33.50

33.75

Fort Custer Dr

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
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- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

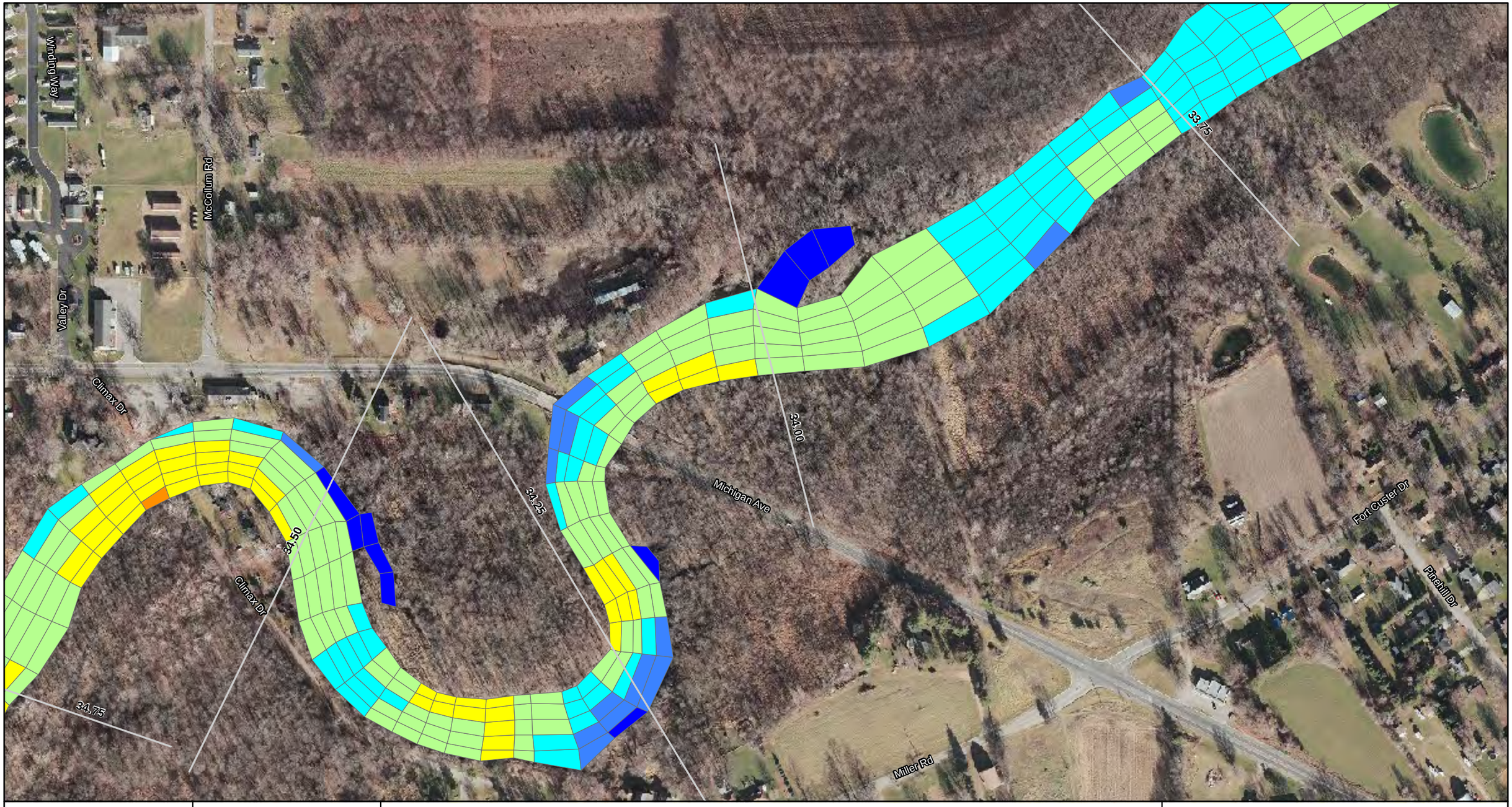
MP 33.10 - MP 33.70

SHEET 44 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500
Scale in Feet

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

MP 33.70 - MP 34.70

SHEET 45 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

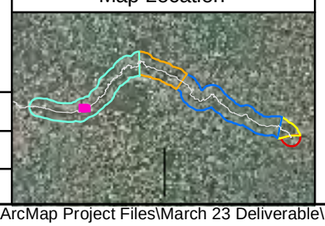
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Aerial Photography Date: November 2011



Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
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- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

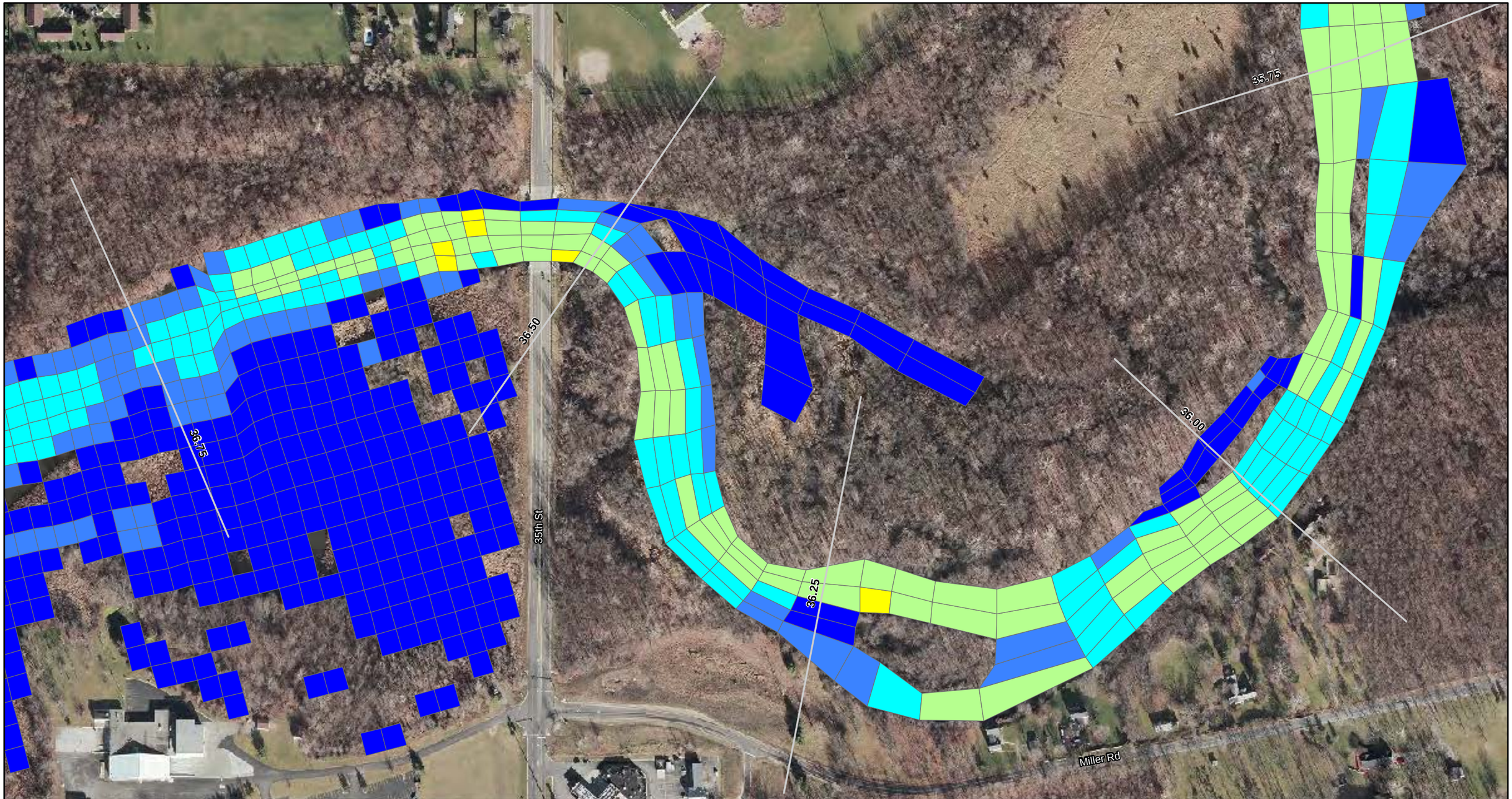
MP 34.70 - MP 35.75

SHEET 46 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May23_2011.mxd

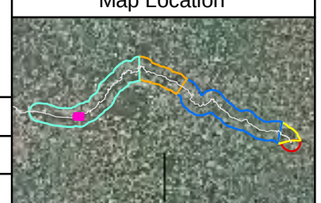
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

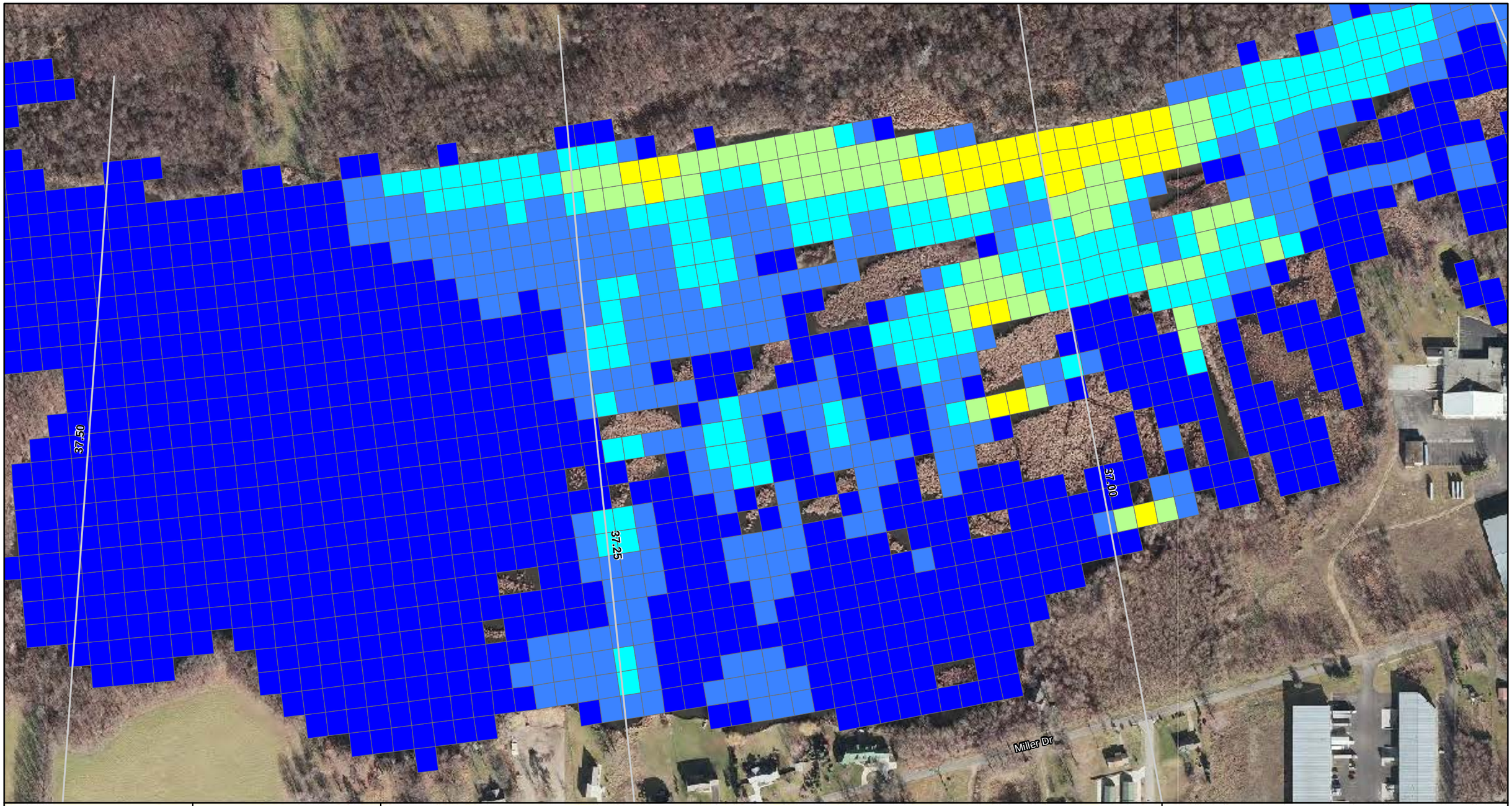
MP 35.75 - MP 36.80

SHEET 47 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May23_2011.mxd

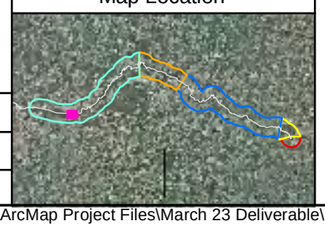
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

MP 36.80 - MP 37.55

SHEET 48 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May23_2011.mxd

Aerial Photography Date: November 2011

38.25

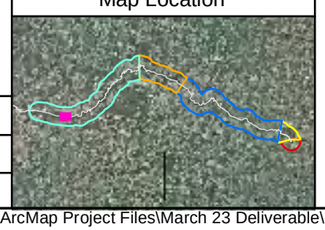
38.00

37.75

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

MP 37.55 - MP 38.30

SHEET 49 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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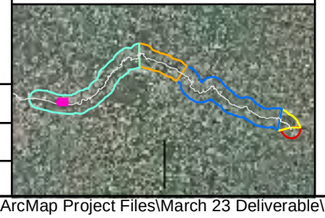
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

MP 37.80 - MP 38.60N

SHEET 50 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

38.50

38.25

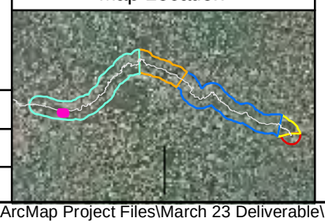
38.00

Lyth Rd

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

MP 37.80 - MP 38.60S

SHEET 51 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

39.00

38.50

38.75

38.25

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

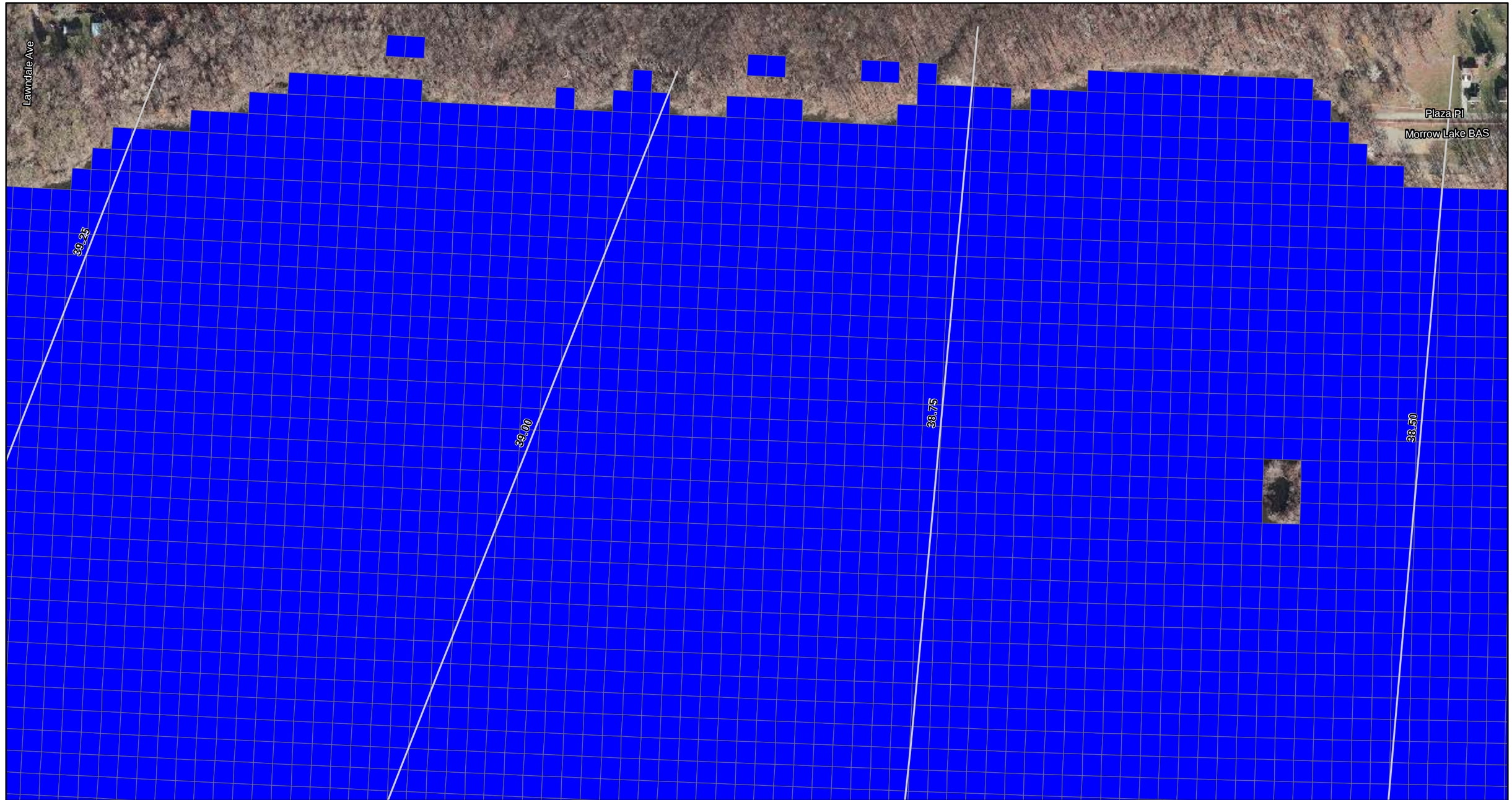
MP 38.25 - MP 39.00C

SHEET 52 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals

cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

MP 38.50 - MP 39.25N

SHEET 53 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

39.25

39.00

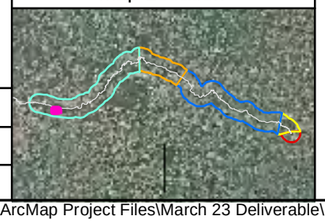
38.75

38.50

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

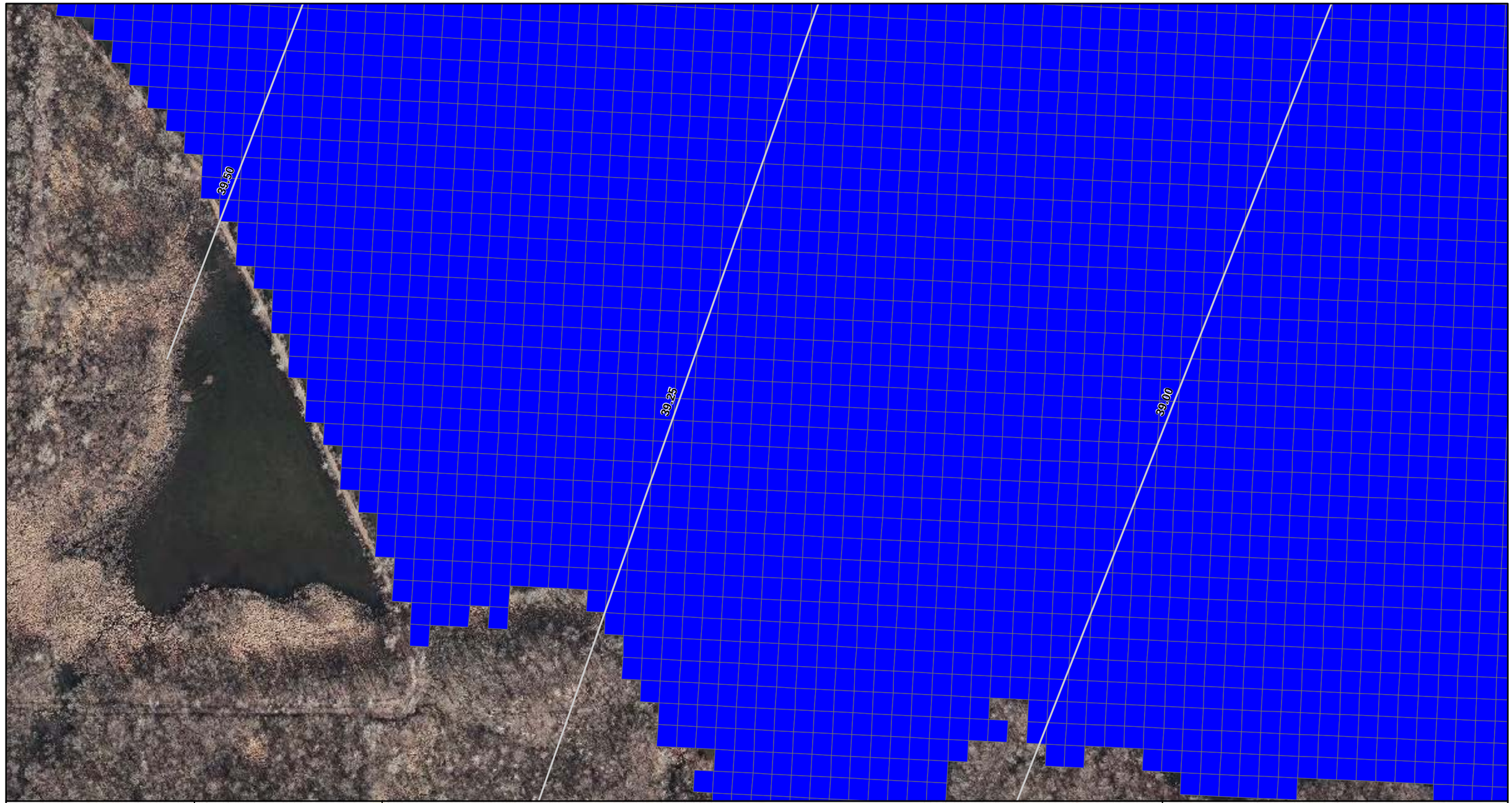
MP 38.50 - MP 39.25S

SHEET 54 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_May23_2011.mxd

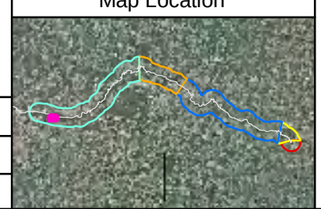
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

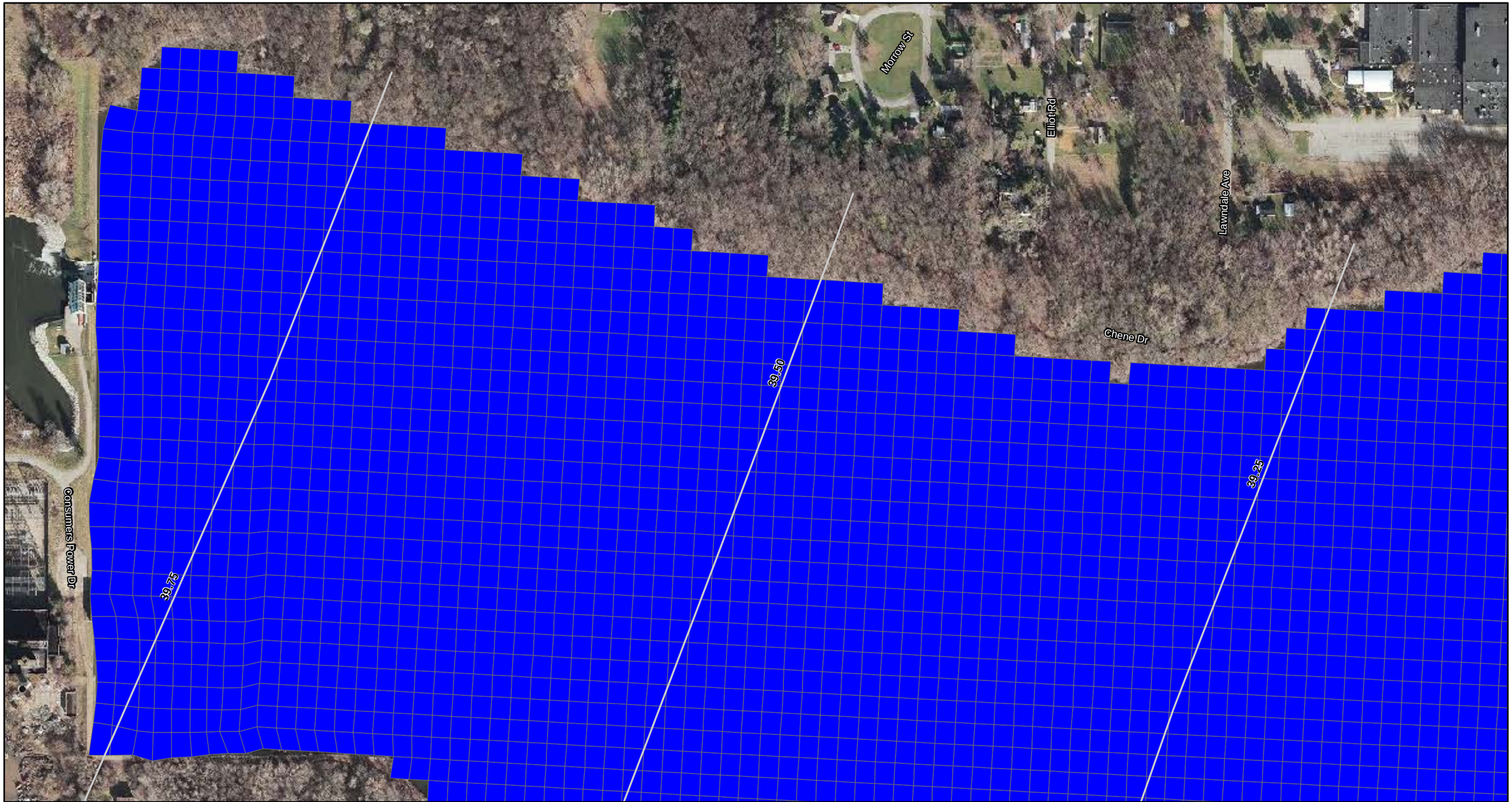
MP 38.90 - MP 39.60S

SHEET 55 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 23, 2011

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,430 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
MAY 23, 2011

MP 39.15 - MP 39.85

SHEET 56 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

Figure 5-13

Riverine Grid: Sedimentation Rate

All Grid Cells

May 16 – May 23, 2011

Sheets 1 through 56



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 01.95 - MP 02.75

SHEET 1 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Sedimentation_Rate_May_2011.mxd

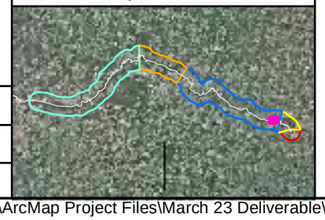
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

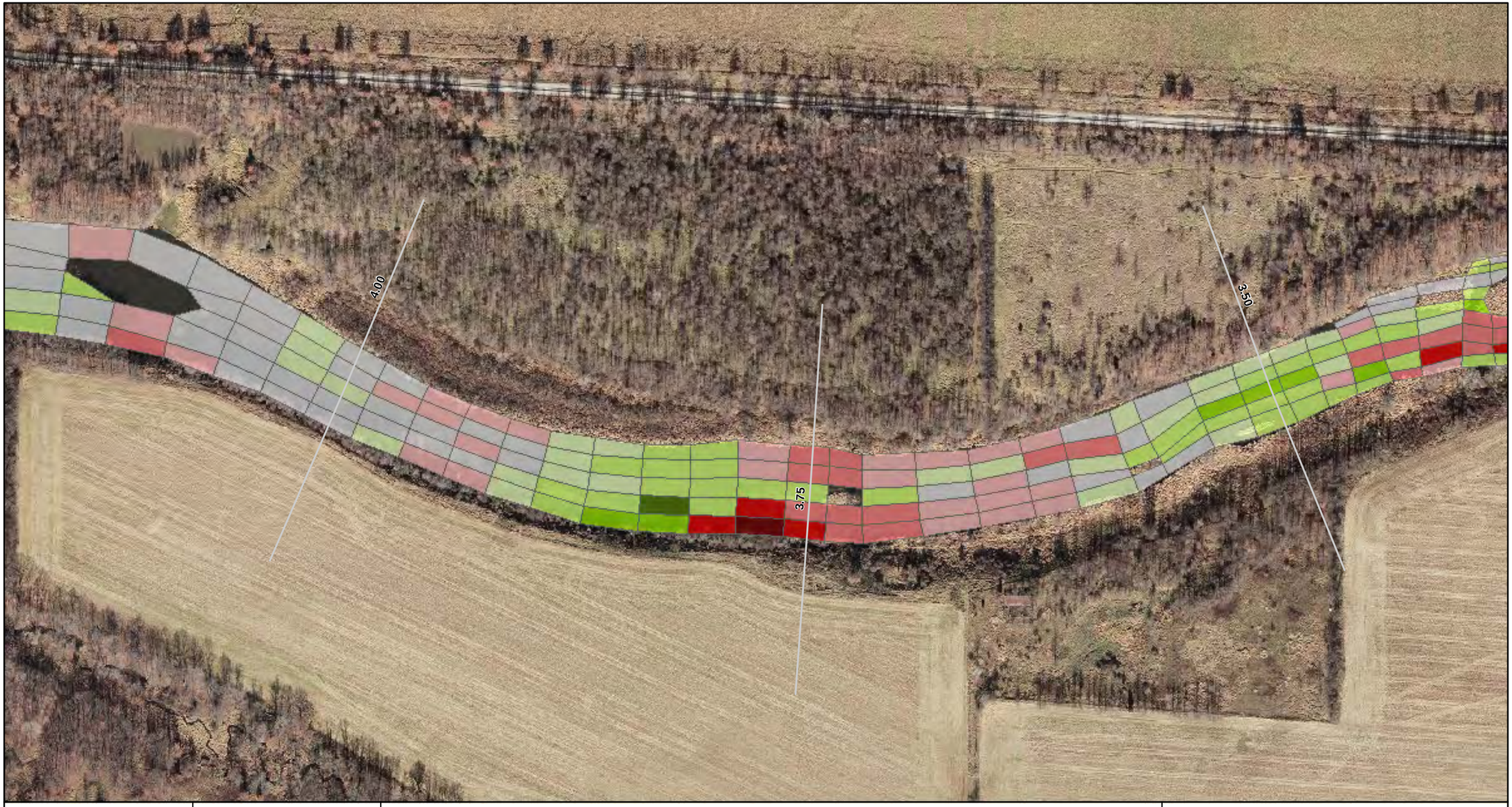
MP 02.60 - MP 03.40

SHEET 2 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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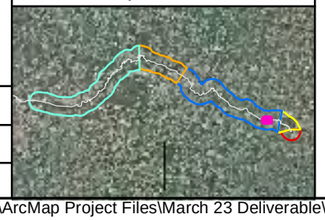
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 03.40 - MP 04.20

SHEET 3 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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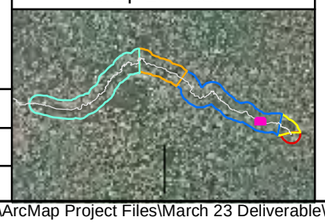
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

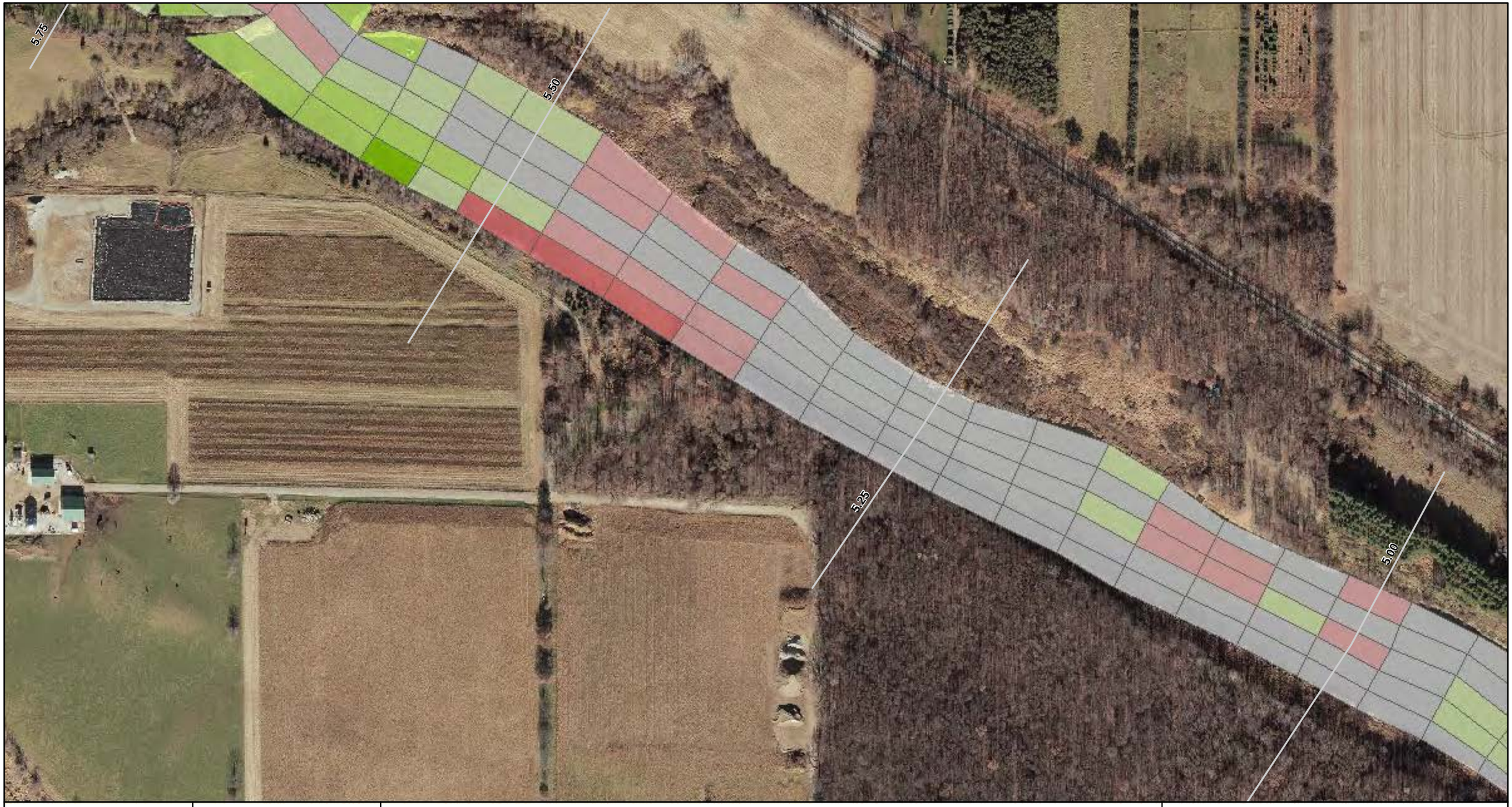
MP 04.15 - MP 05.00

SHEET 4 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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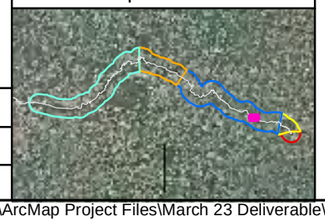
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 04.90 - MP 05.65

SHEET 5 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 05.65 - MP 06.30

SHEET 6 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

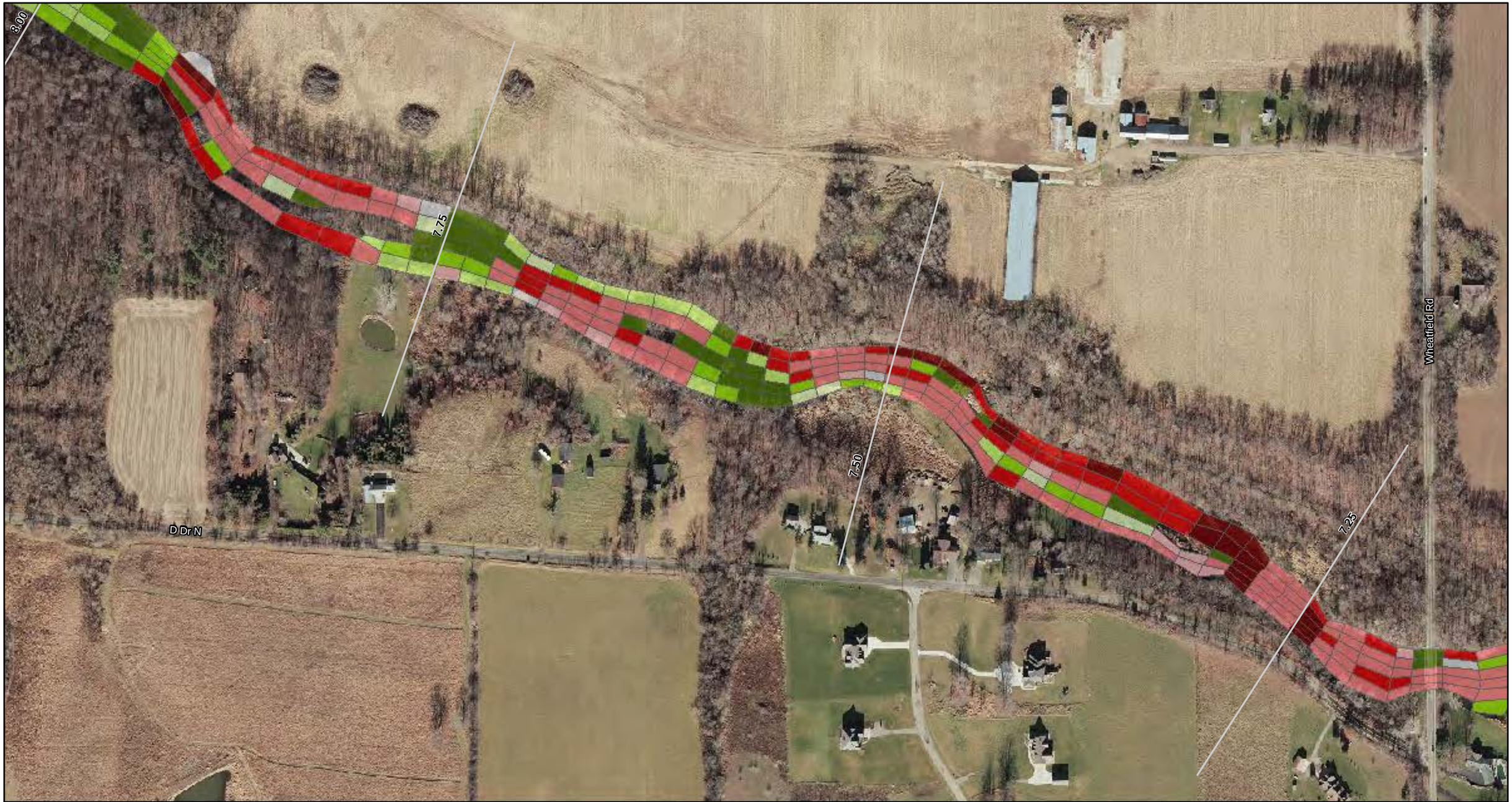
MP 06.20 - MP 07.15

SHEET 7 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 07.15 - MP 07.95

SHEET 8 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

8.75

8.50

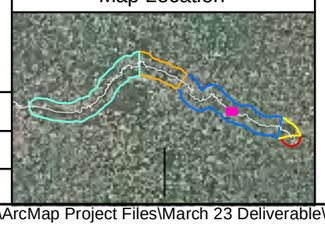
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8.00

ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 07.90 - MP 08.75

SHEET 9 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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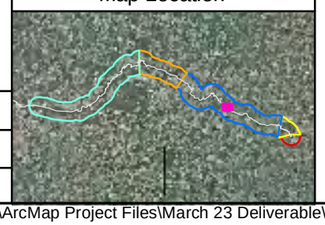
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 08.70 - MP 09.30

SHEET 10 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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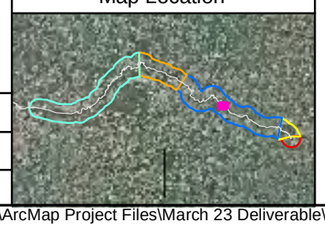
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 09.25 - MP 10.05

SHEET 11 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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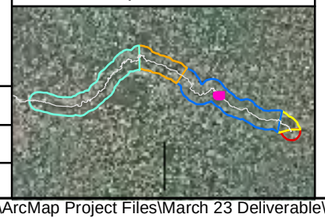
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 10.00 - MP 10.65

SHEET 12 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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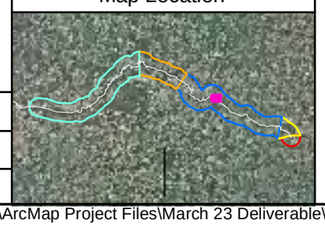
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 10.60 - MP 11.40

SHEET 13 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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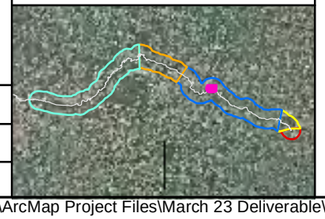
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 11.10 - MP 12.45

SHEET 14 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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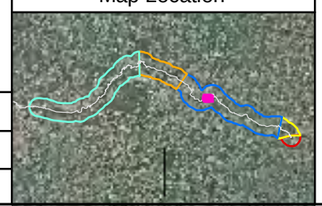
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 12.30 - MP 13.05

SHEET 15 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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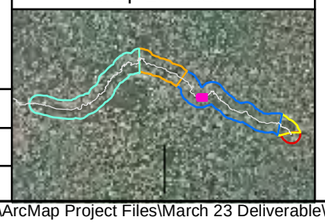
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

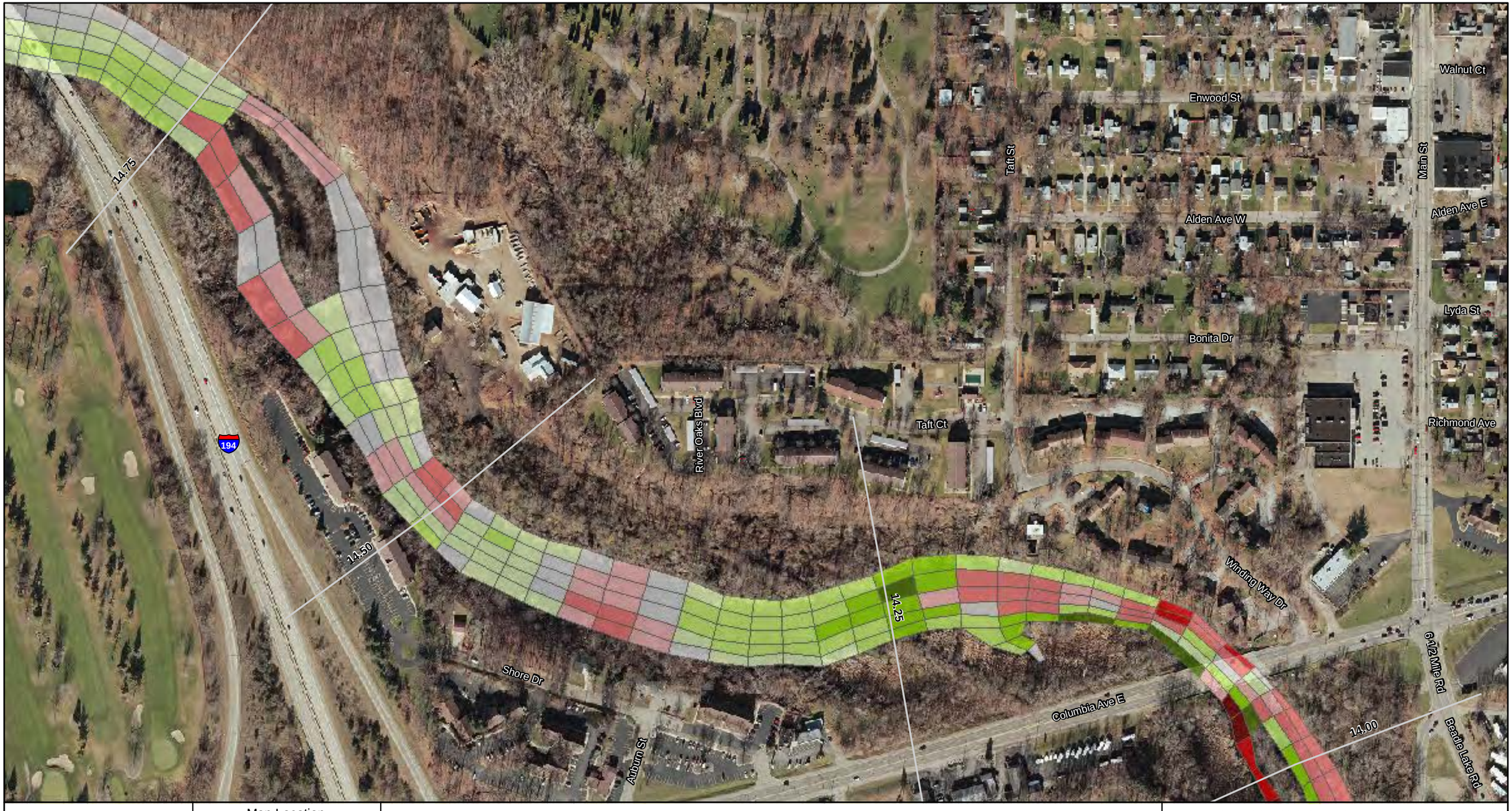
MP 13.00 - MP 14.10

SHEET 16 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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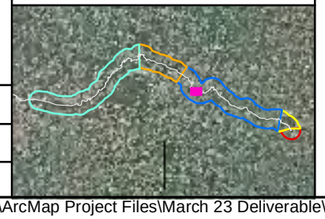
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 14.00 - MP 14.85

SHEET 17 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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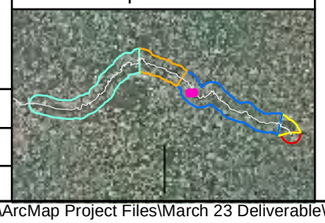
Aerial Photography Date: November 2011

Burnham St E
15.25
Scenery St
Logan St
Mineral Ave
Sisson Ave
Riverside Dr
Riverside Ct
Riverside Pkwy
Territorial Rd E
15.00
14.75
194
Fonda Ave
Kenosha Ave
Pauline Ave
Rockford St
South Ave
Oak Hill Dr
Echo St

ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)
All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500
Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

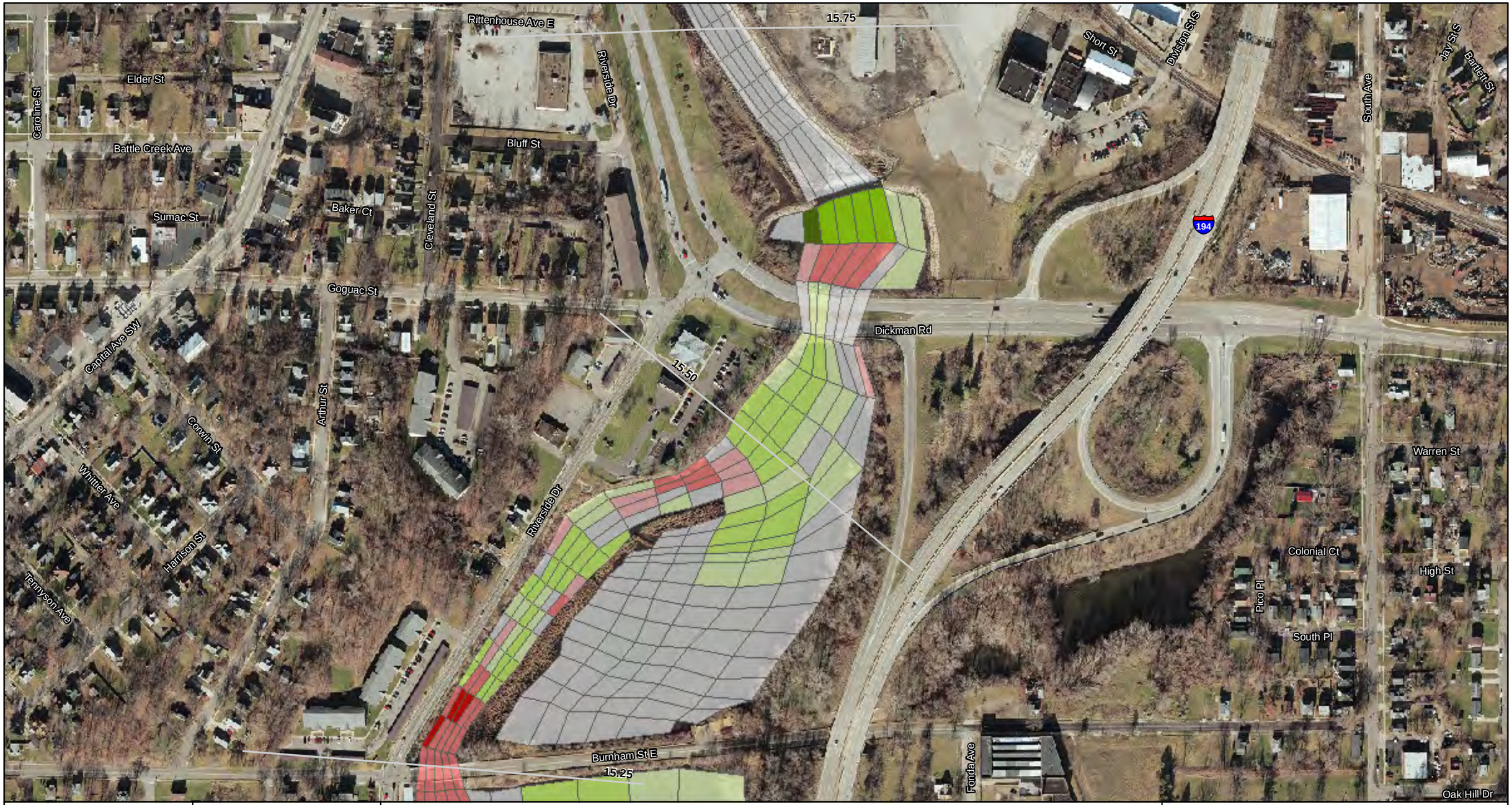
MP 14.65 - MP 15.25

SHEET 18 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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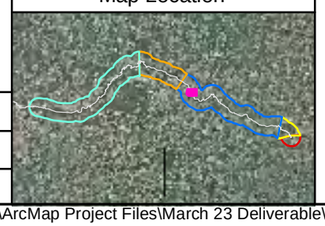
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 15.25 - MP 15.75

SHEET 19 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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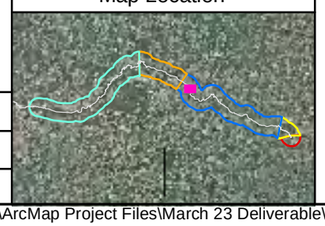
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 15.75 - MP 16.30

SHEET 20 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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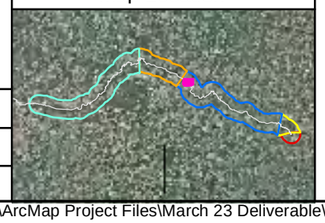
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

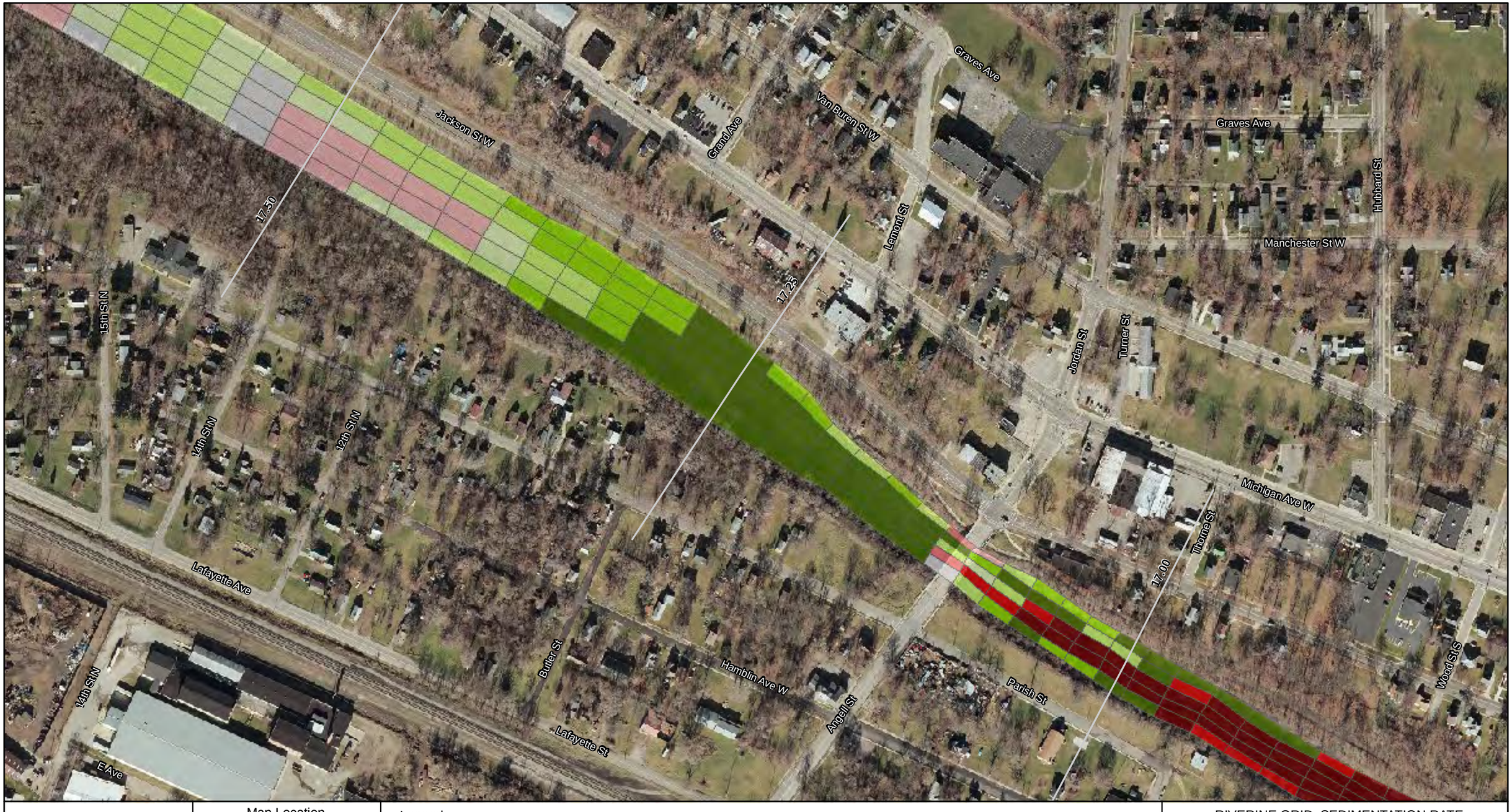
MP 16.30 - MP 16.95

SHEET 21 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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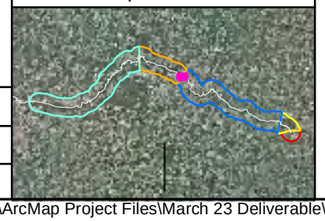
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 16.85 - MP 17.60

SHEET 22 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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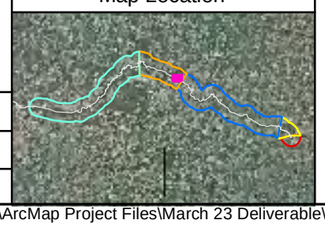
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

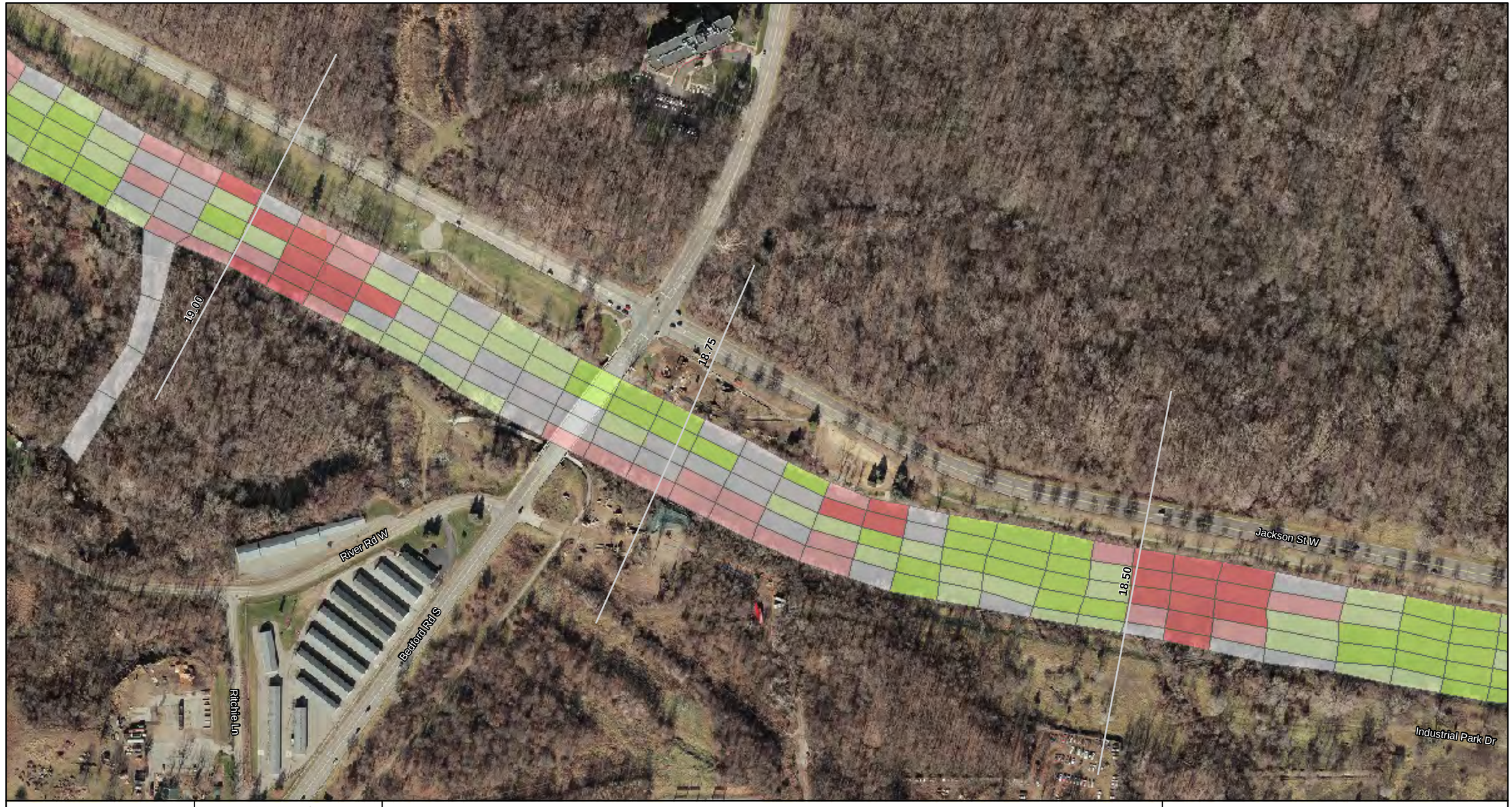
MP 17.60 - MP 18.40

SHEET 23 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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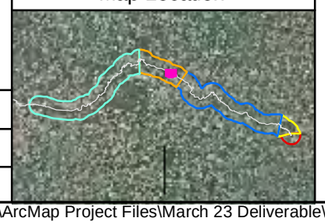
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

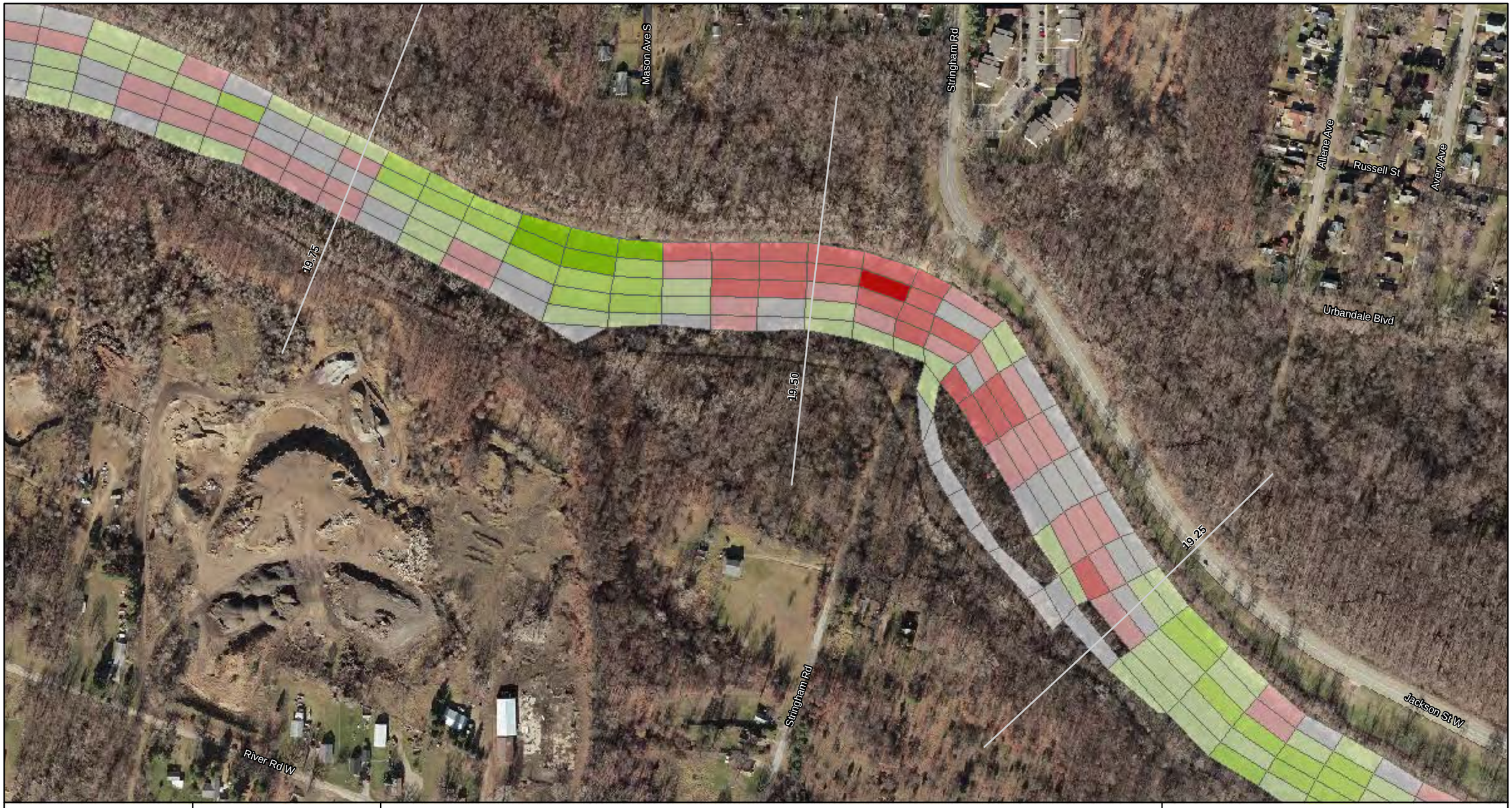
MP 18.30 - MP 19.15

SHEET 24 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Sedimentation_Rate_May_2011.mxd

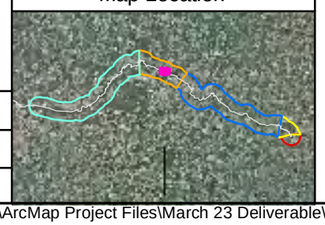
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

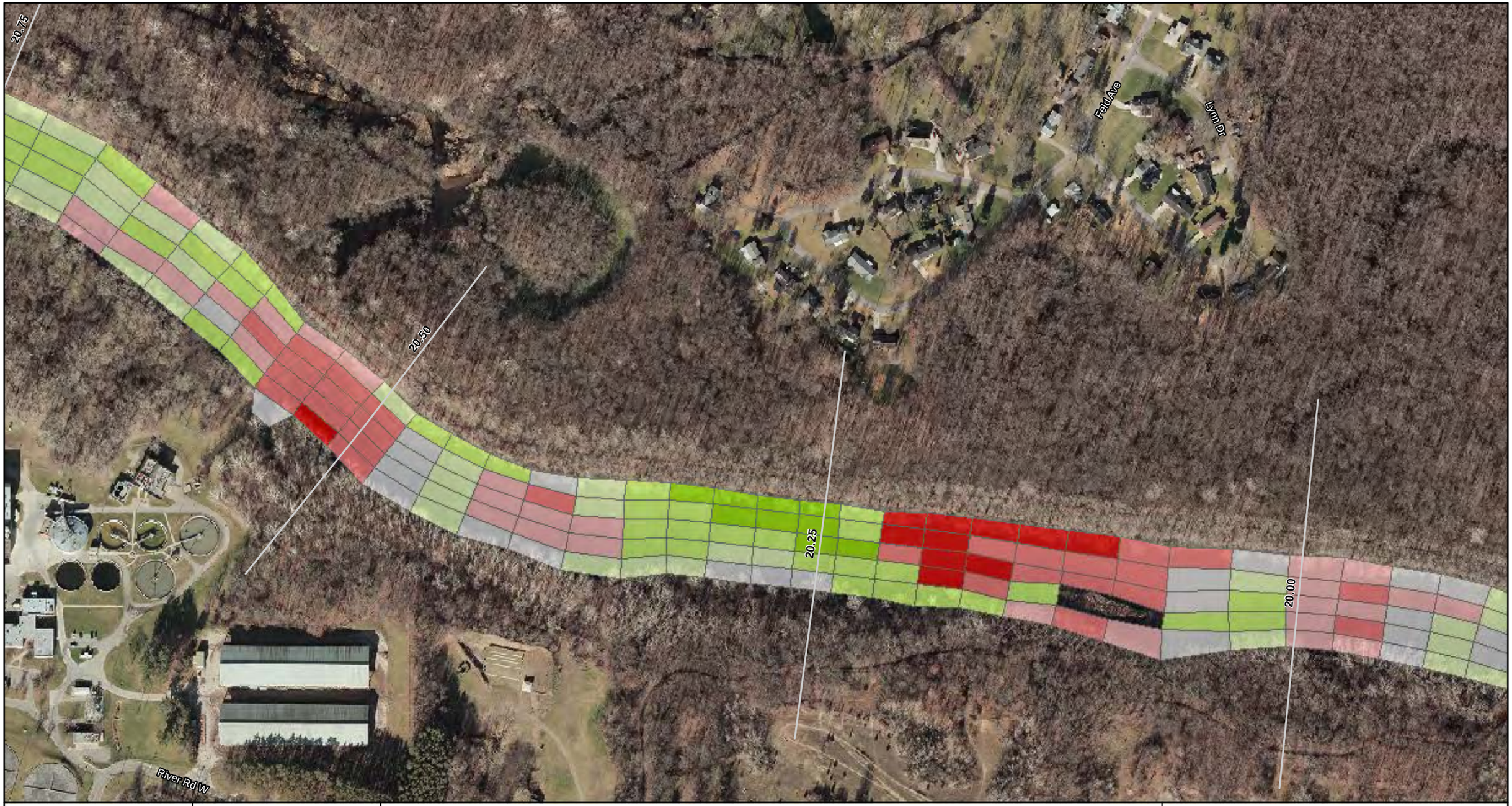
MP 19.10 - MP 19.95

SHEET 25 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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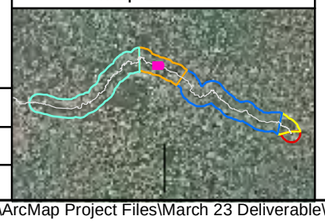
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

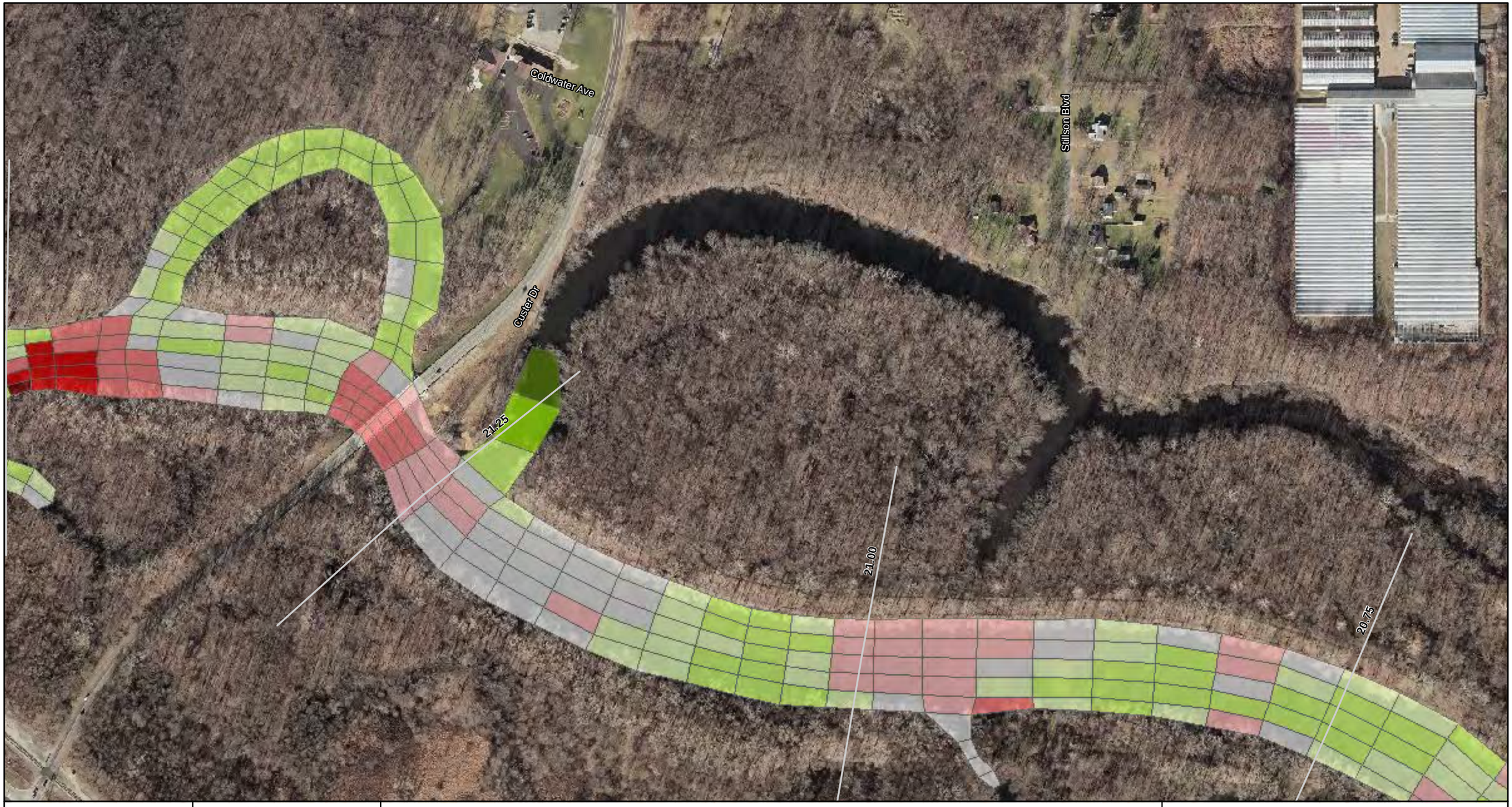
MP 19.90 - MP 20.75

SHEET 26 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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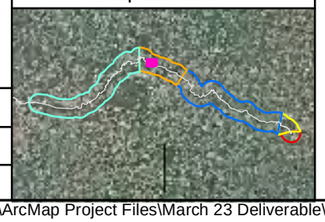
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 20.70 - MP 21.50

SHEET 27 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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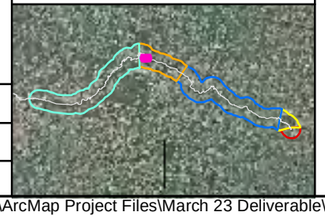
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 21.35 - MP 22.15

SHEET 28 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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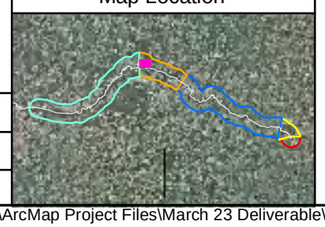
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 22.15 - MP 22.90

SHEET 29 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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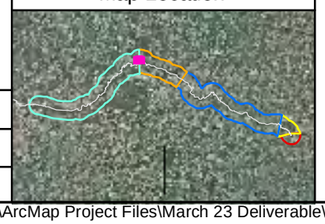
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 22.80 - MP 24.10

SHEET 30 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 24.10 - MP 24.85

SHEET 31 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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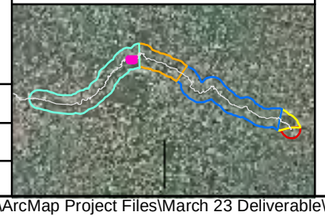
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 24.80 - MP 25.65

SHEET 32 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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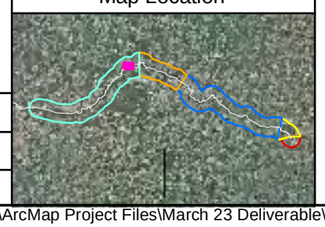
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 25.55 - MP 26.40

SHEET 33 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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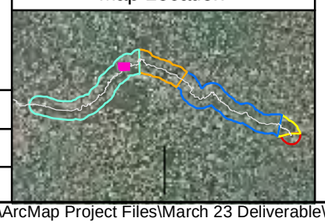
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 26.40 - MP 27.45

SHEET 34 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 27.45 - MP 28.10

SHEET 35 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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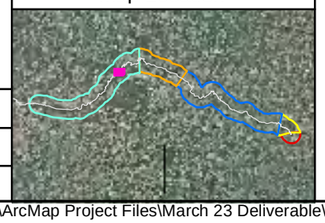
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 28.05 - MP 28.85

SHEET 36 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

Clinton St
Clinton St
Chestnut St
Webster St
Church St
Fayette St
Cass St
Cherry St
Lincoln St
28.75
29.00
29.25
29.50
Augusta Climax Rd
Fort Custer Rec Area Access

ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 28.85 - MP29.55

SHEET 37 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

29.50

29.75

Fort Custer Rec Area Service

Fort Custer Rec Area Access

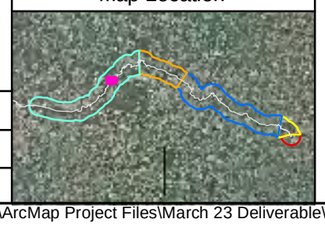
30.25

30.00

ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 29.50 - MP29.95

SHEET 38 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Sedimentation_Rate_May_2011.mxd

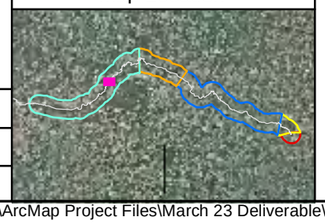
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 29.95 - MP 30.80

SHEET 39 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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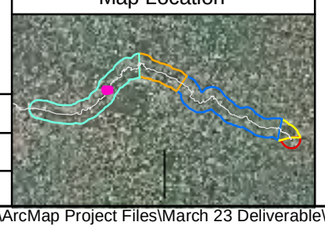
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

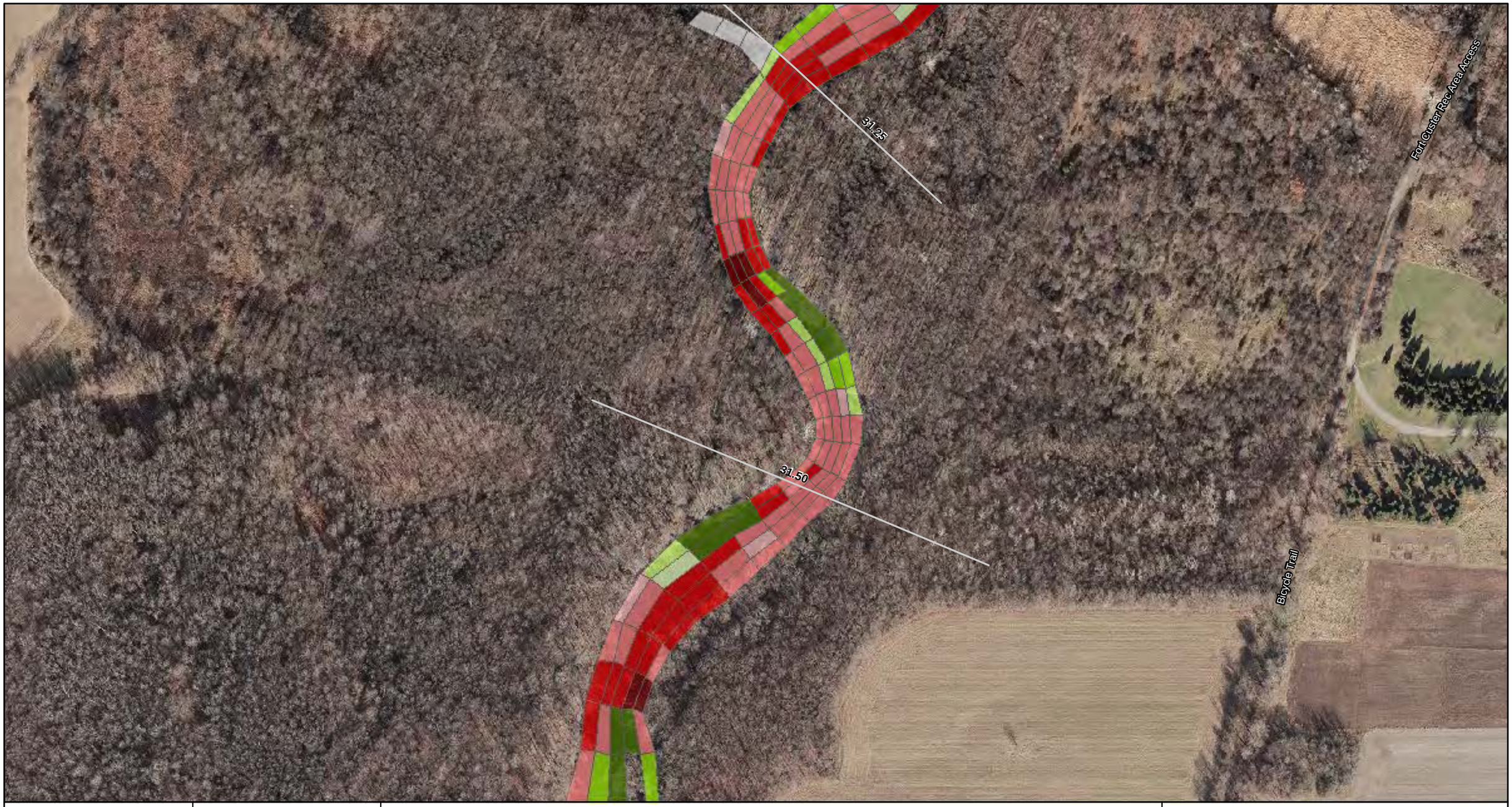
MP 30.75 - MP 31.25

SHEET 40 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

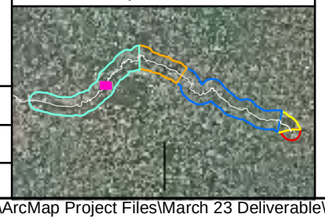
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Aerial Photography Date: November 2011



Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 31.25 - MP 31.70

SHEET 41 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Sedimentation_Rate_May_2011.mxd

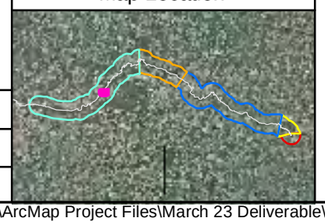
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 31.65 - MP 32.25

SHEET 42 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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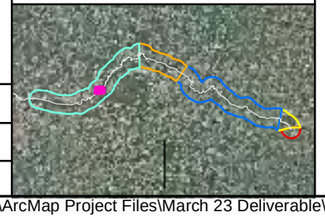
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 32.25 - MP 33.10

SHEET 43 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 33.10 - MP 33.70

SHEET 44 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 33.70 - MP 34.70

SHEET 45 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

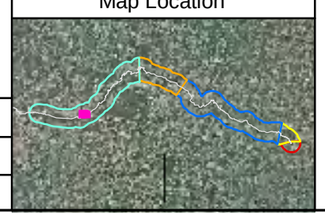
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Aerial Photography Date: November 2011



Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 34.70 - MP 35.75

SHEET 46 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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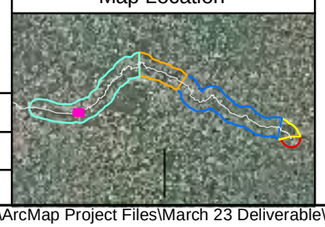
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

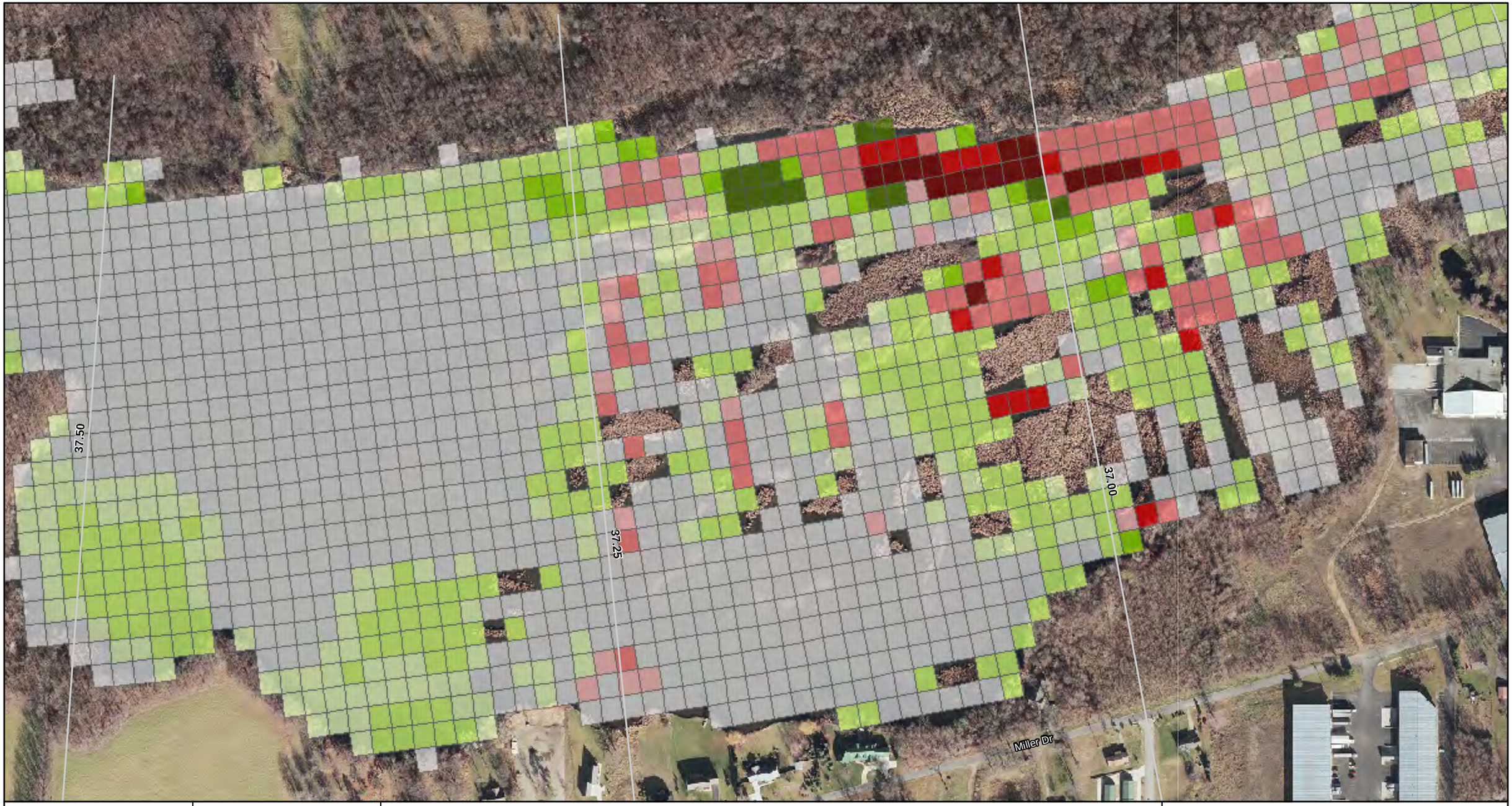
MP 35.75 - MP 36.80

SHEET 47 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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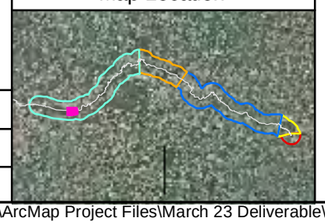
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 36.80 - MP 37.55

SHEET 48 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

38.25

38.00

37.75

ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

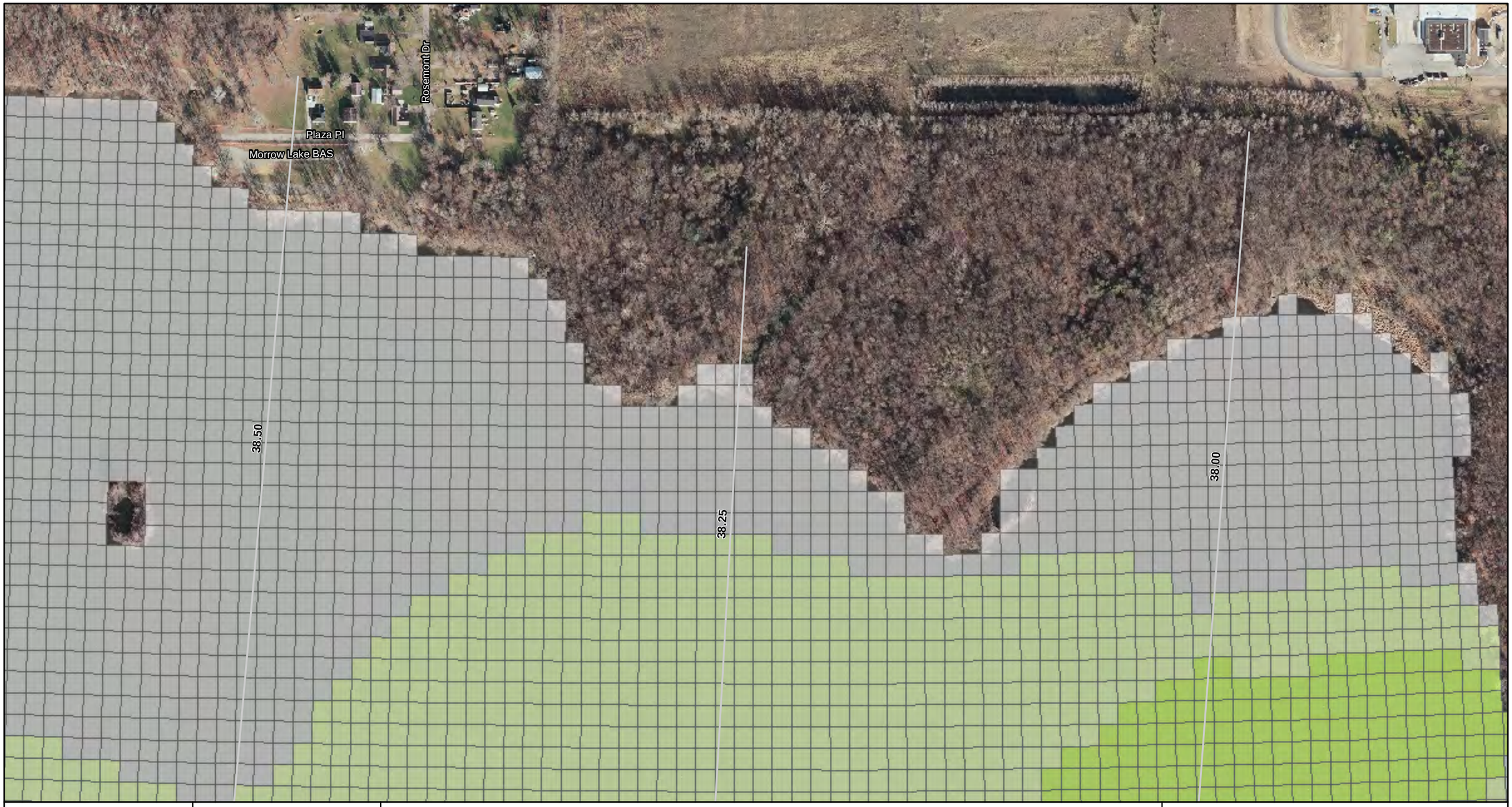
MP 37.55 - MP 38.30

SHEET 49 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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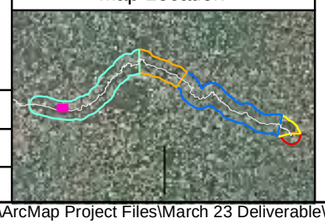
Aerial Photography Date: November 2011



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Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

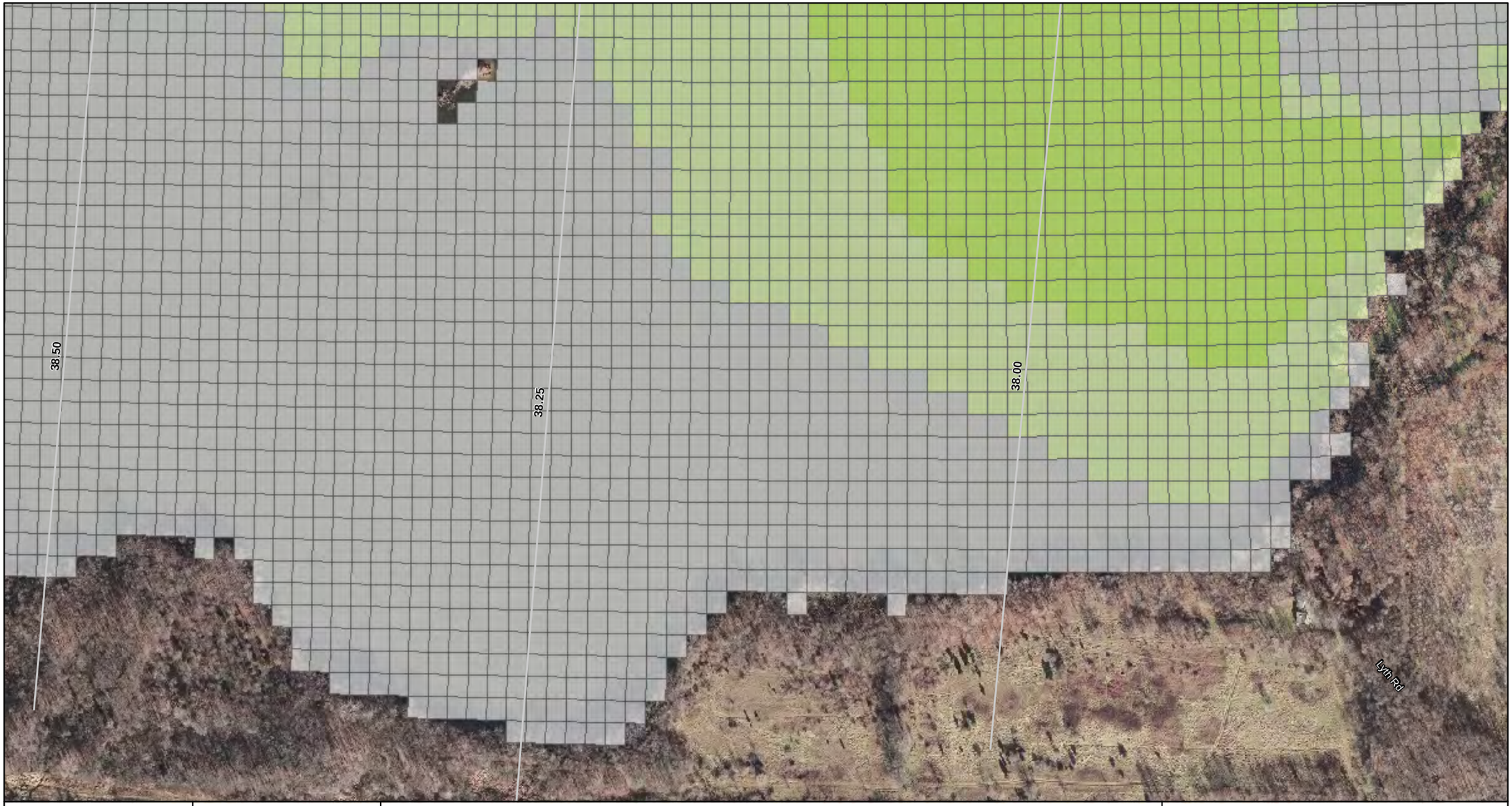
MP 37.80 - MP 38.60N

SHEET 50 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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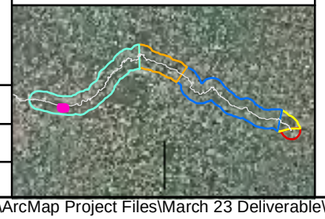
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 37.80 - MP 38.60S

SHEET 51 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

39.00

38.50

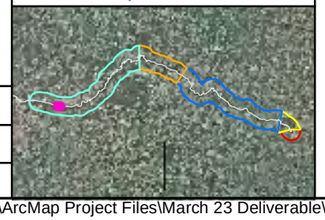
38.75

38.25

ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

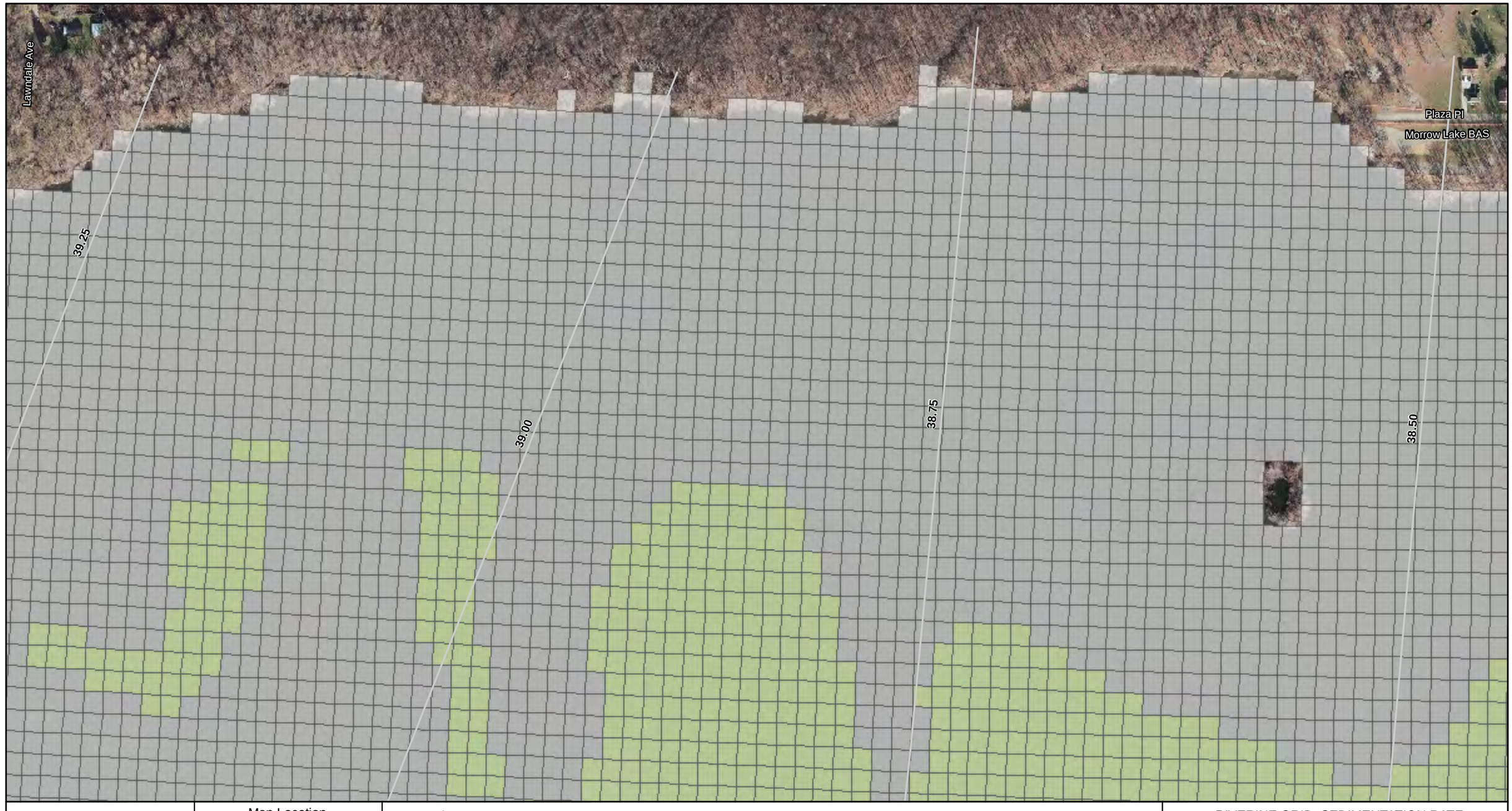
MP 38.25 - MP 39.00C

SHEET 52 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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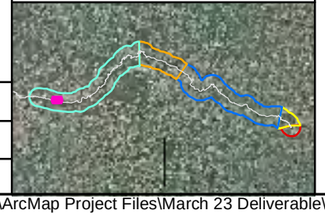
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 38.50 - MP 39.25N

SHEET 53 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

39.25

39.00

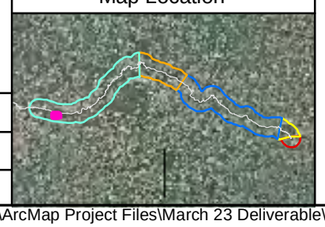
38.75

38.50

ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 38.50 - MP 39.25S

SHEET 54 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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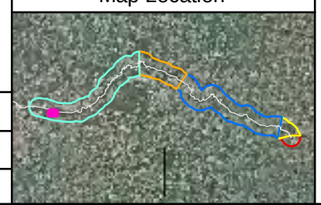
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 38.90 - MP 39.60S

SHEET 55 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 16 - MAY 23, 2011

MP 39.15 - MP 39.85

SHEET 56 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

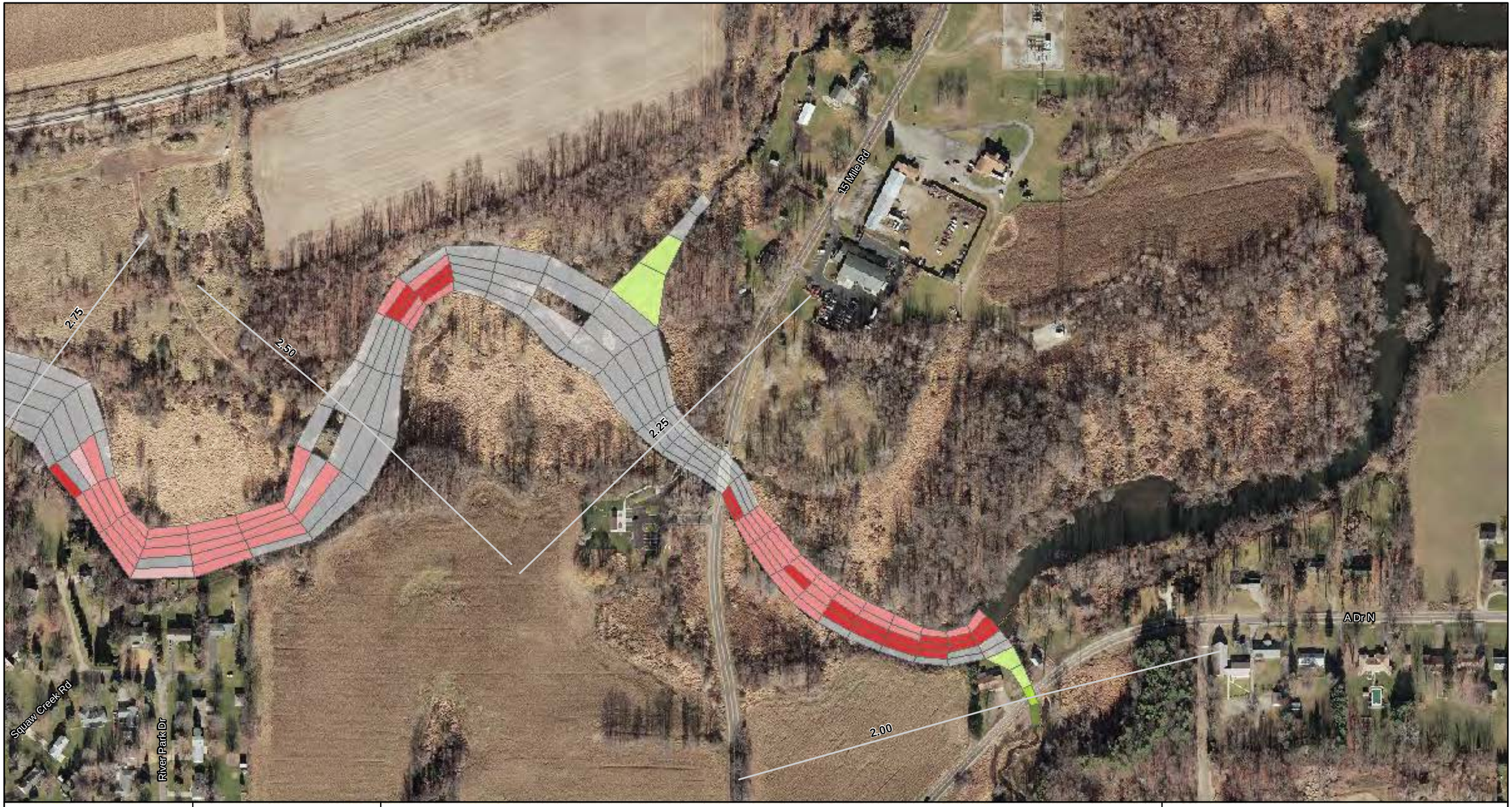
Figure 5-14

Riverine Grid: Sedimentation Rate

Cells with Net Change in Silt or Clay Mass

May 16 – May 23, 2011

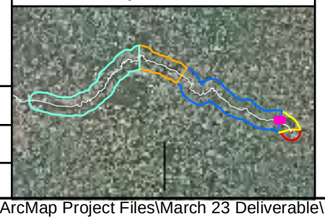
Sheets 1 through 56



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 01.95 - MP 02.75

SHEET 1 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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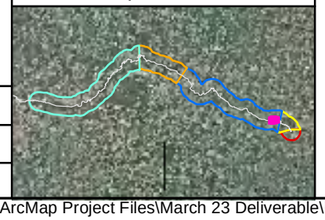
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 02.60 - MP 03.40

SHEET 2 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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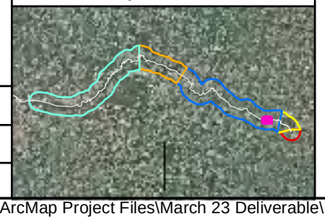
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 03.40 - MP 04.20

SHEET 3 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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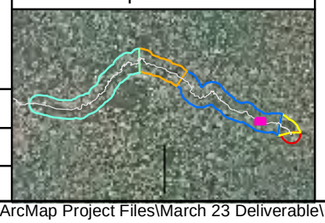
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 04.15 - MP 05.00

SHEET 4 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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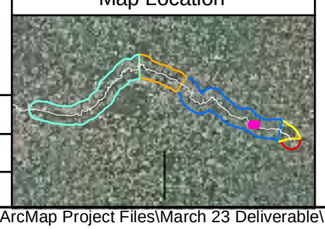
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 04.90 - MP 05.65

SHEET 5 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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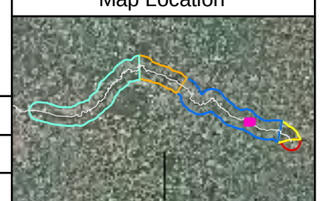
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

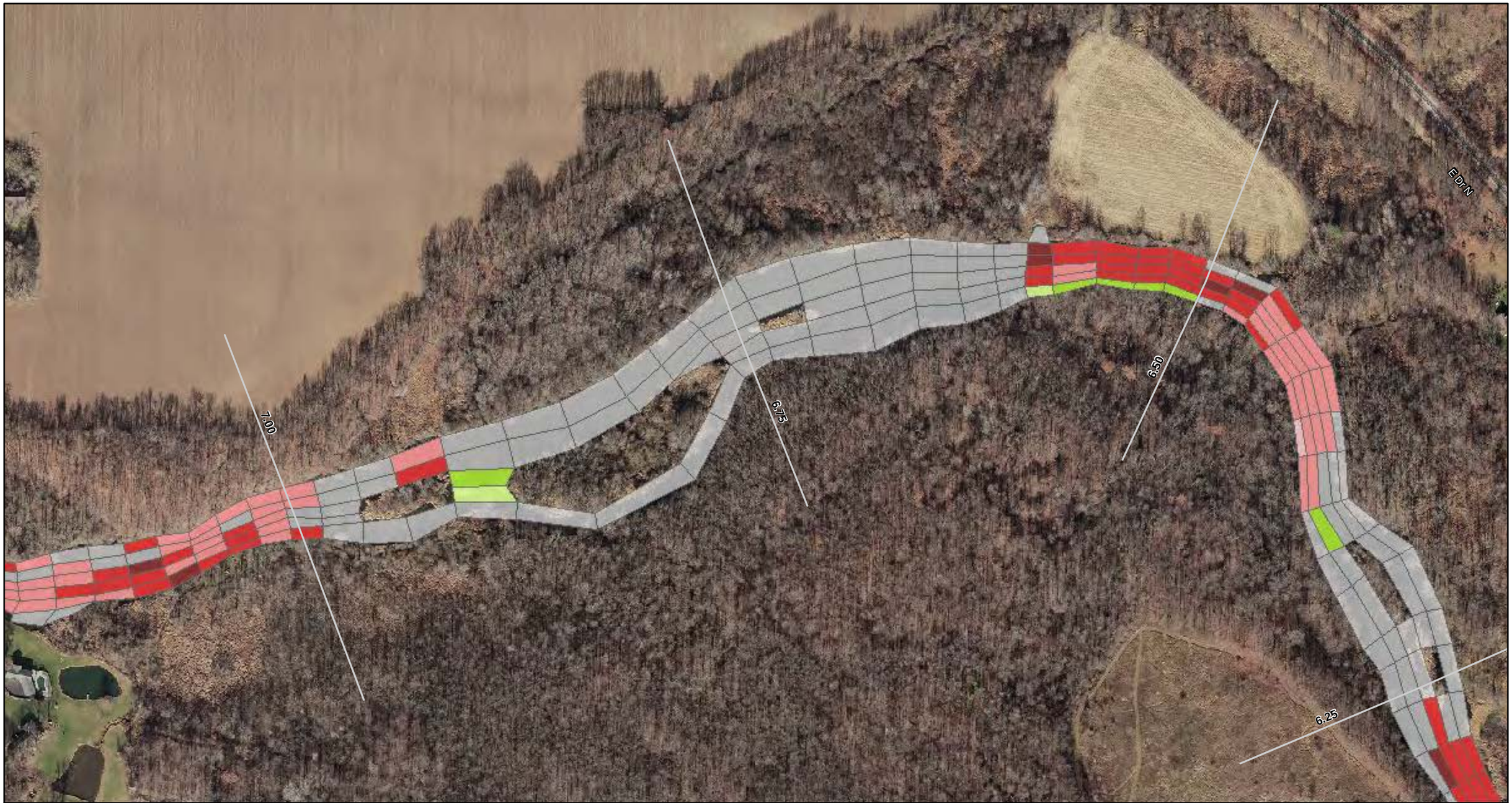
MP 05.65 - MP 06.30

SHEET 6 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 06.20 - MP 07.15

SHEET 7 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
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ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 07.15 - MP 07.95

SHEET 8 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

8.75

8.50

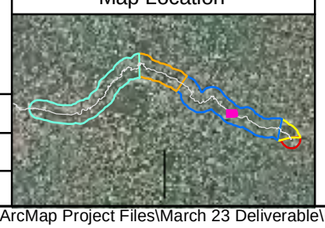
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Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
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- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 07.90 - MP 08.75

SHEET 9 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

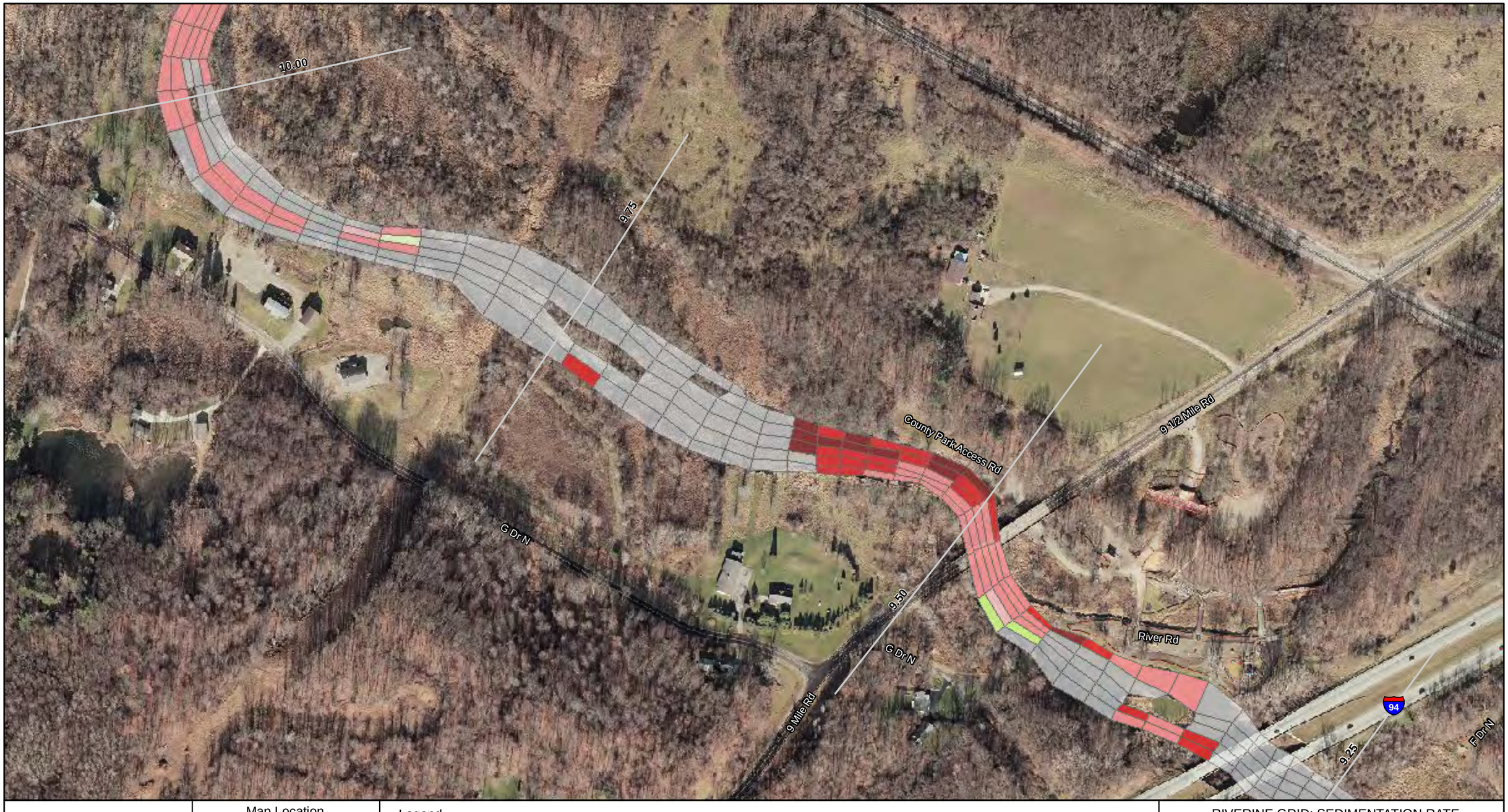
MP 08.70 - MP 09.30

SHEET 10 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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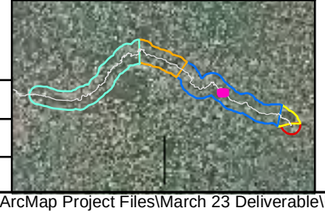
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 09.25 - MP 10.05

SHEET 11 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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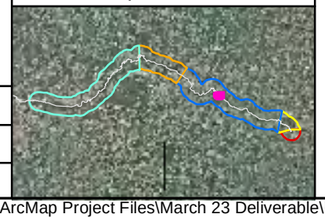
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 10.00 - MP 10.65

SHEET 12 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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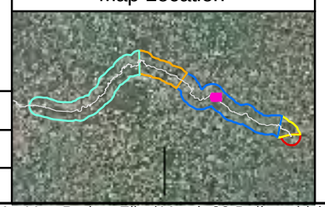
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 10.60 - MP 11.40

SHEET 13 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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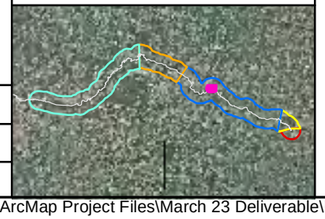
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 11.10 - MP 12.45

SHEET 14 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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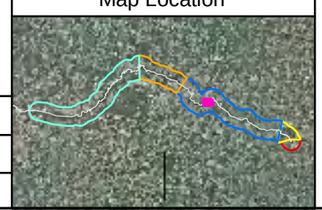
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 12.30 - MP 13.05

SHEET 15 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
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- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

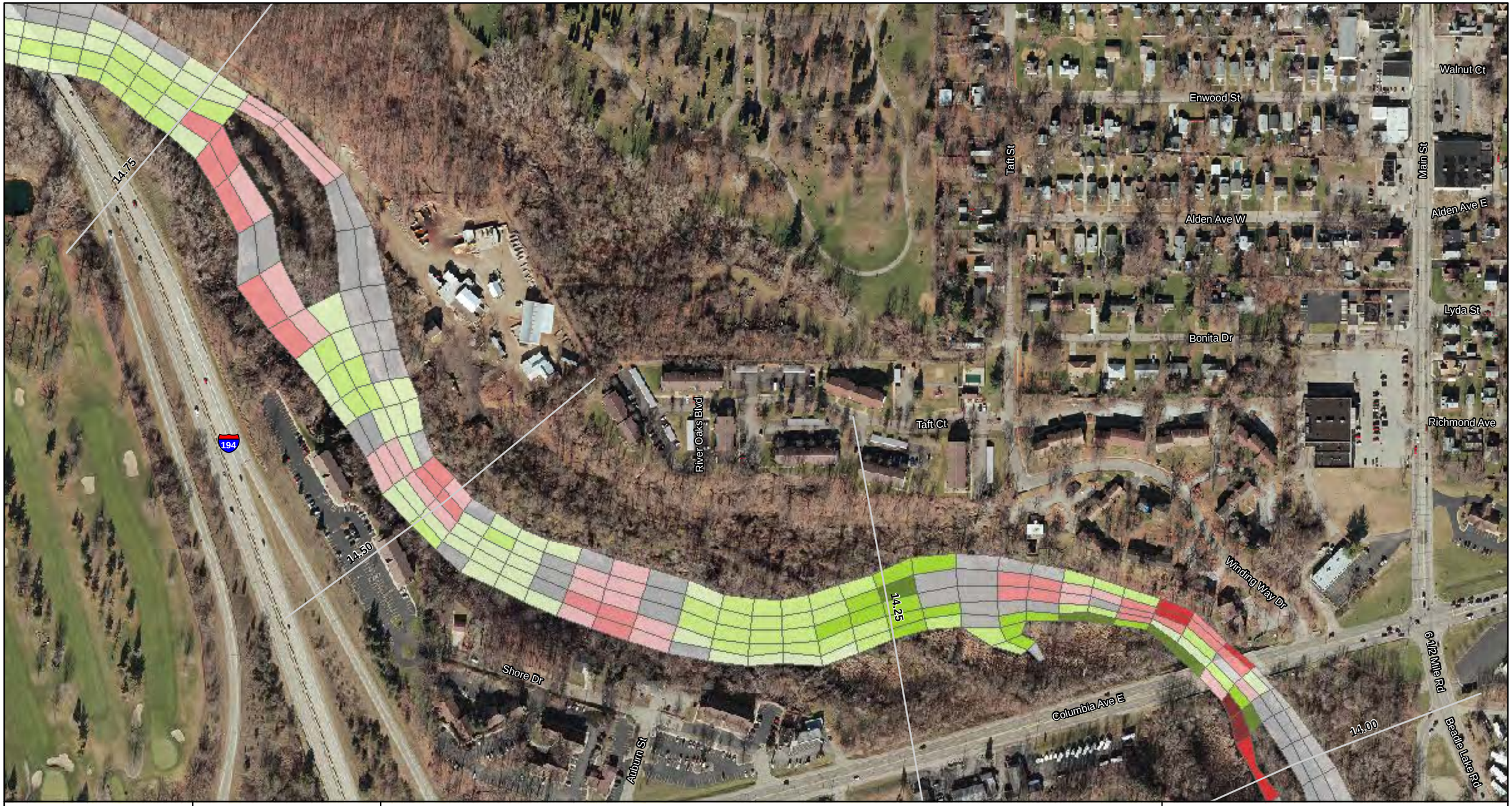
MP 13.00 - MP 14.10

SHEET 16 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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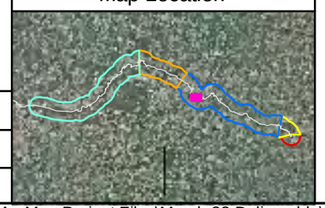
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

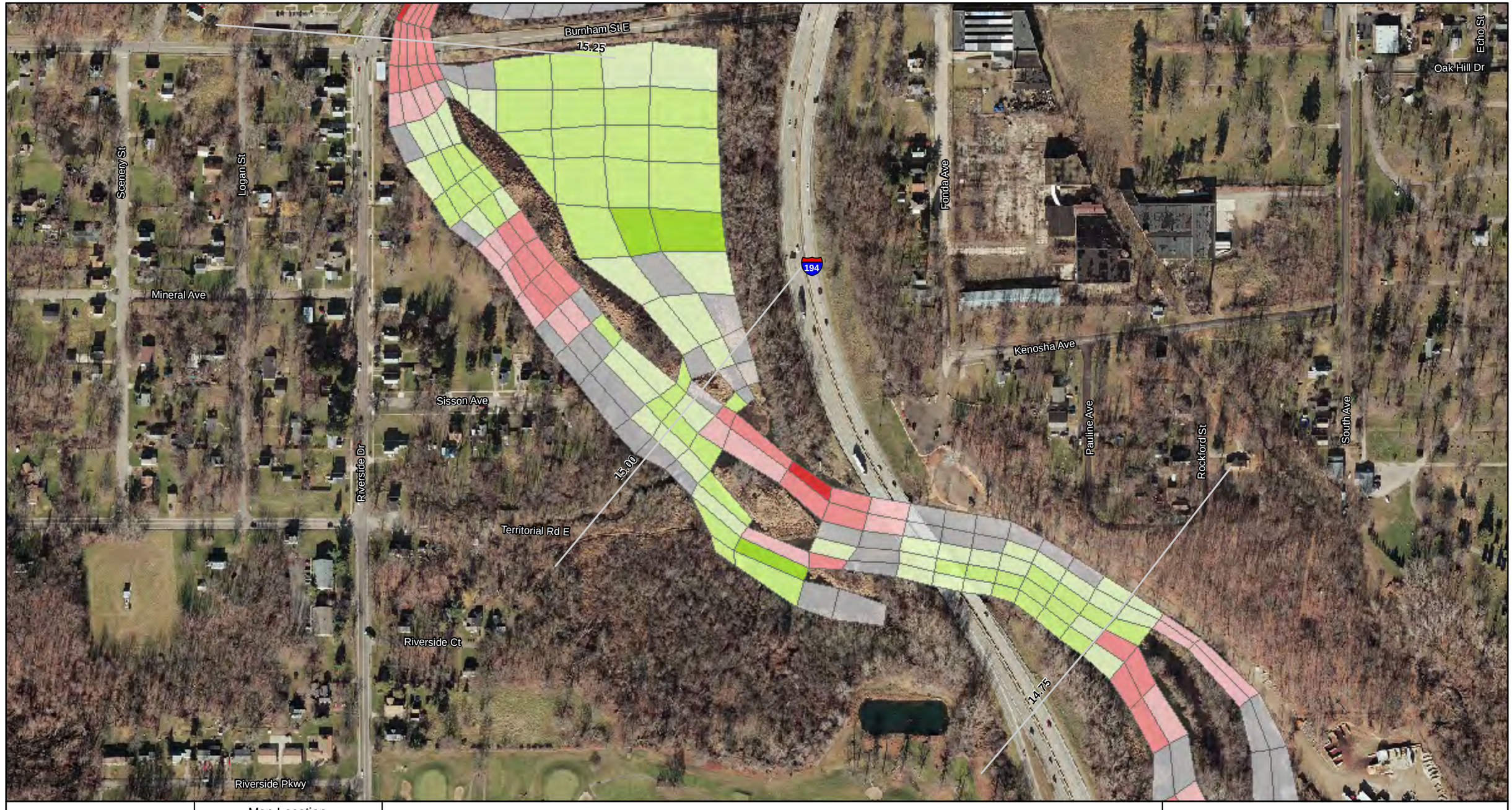
MP 14.00 - MP 14.85

SHEET 17 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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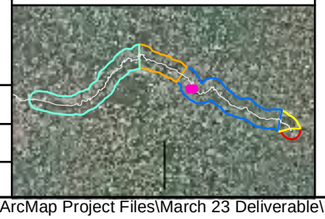
Aerial Photography Date: November 2011



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Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

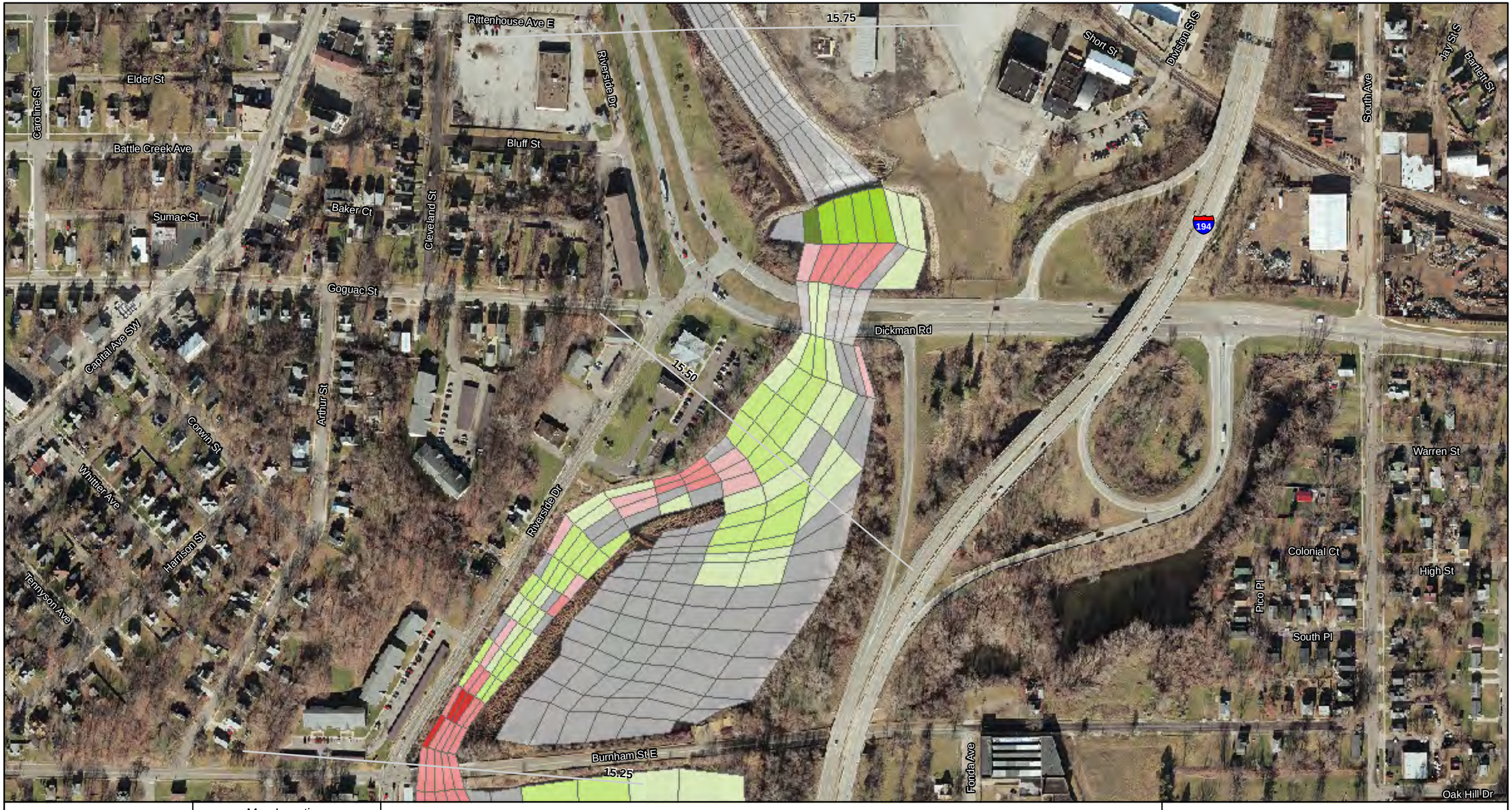
MP 14.65 - MP 15.25

SHEET 18 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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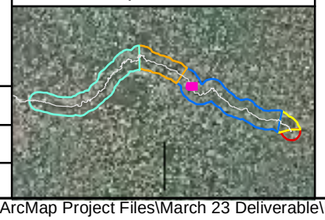
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 15.25 - MP 15.75

SHEET 19 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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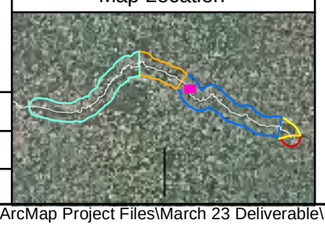
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 15.75 - MP 16.30

SHEET 20 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

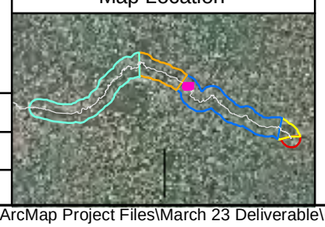
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Aerial Photography Date: November 2011

Cass St N
Champion St
Brook St
Michigan Ave W
Washington Ave N
Cass St S
Could St
Van Buren St W
Archer Ct
Jackson St W
Service St
Hamblin Ave W
16.75
Barney St
Lafayette St
Kendal St S
16.50
Washington Ave S
Putnam St
Page St
Louise St
Carlyle St
Houston St
Grand Trunk Ave
Dickman Rd
16.25

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 16.30 - MP 16.95

SHEET 21 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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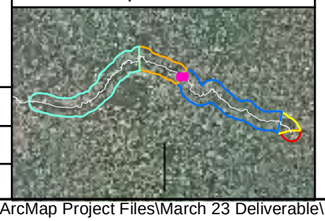
Aerial Photography Date: November 2011



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Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 16.85 - MP 17.60

SHEET 22 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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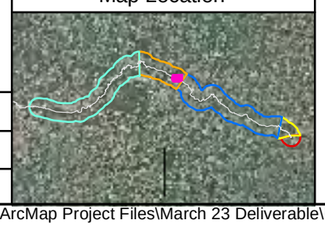
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 17.60 - MP 18.40

SHEET 23 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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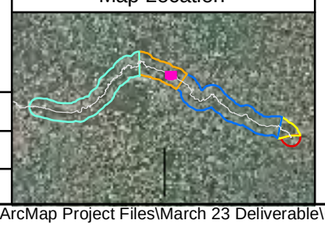
Aerial Photography Date: November 2011



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Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 18.30 - MP 19.15

SHEET 24 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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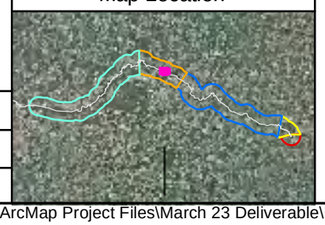
Aerial Photography Date: November 2011



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Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 19.10 - MP 19.95

SHEET 25 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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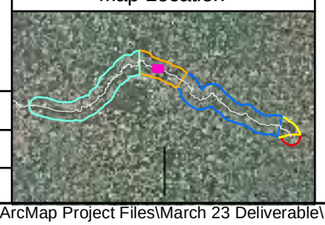
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 19.90 - MP 20.75

SHEET 26 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

Coldwater Ave

Custer Dr

Stillson Blvd

21.25

21.00

20.75

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Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 20.70 - MP 21.50

SHEET 27 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

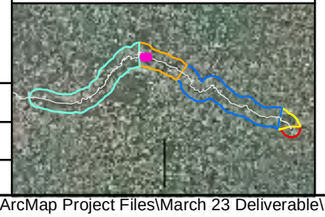
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Aerial Photography Date: November 2011



Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 21.35 - MP 22.15

SHEET 28 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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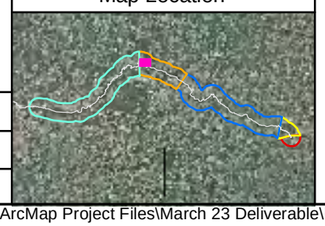
Aerial Photography Date: November 2011



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Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 22.15 - MP 22.90

SHEET 29 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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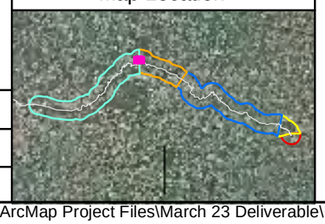
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 22.80 - MP 24.10

SHEET 30 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

24.00
24.25
24.50
24.75
River Rd W
Fort Custer Dr
County Line Rd

ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 24.10 - MP 24.85

SHEET 31 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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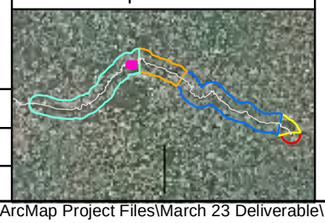
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 24.80 - MP 25.65

SHEET 32 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

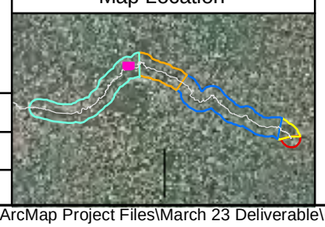
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Aerial Photography Date: November 2011



Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

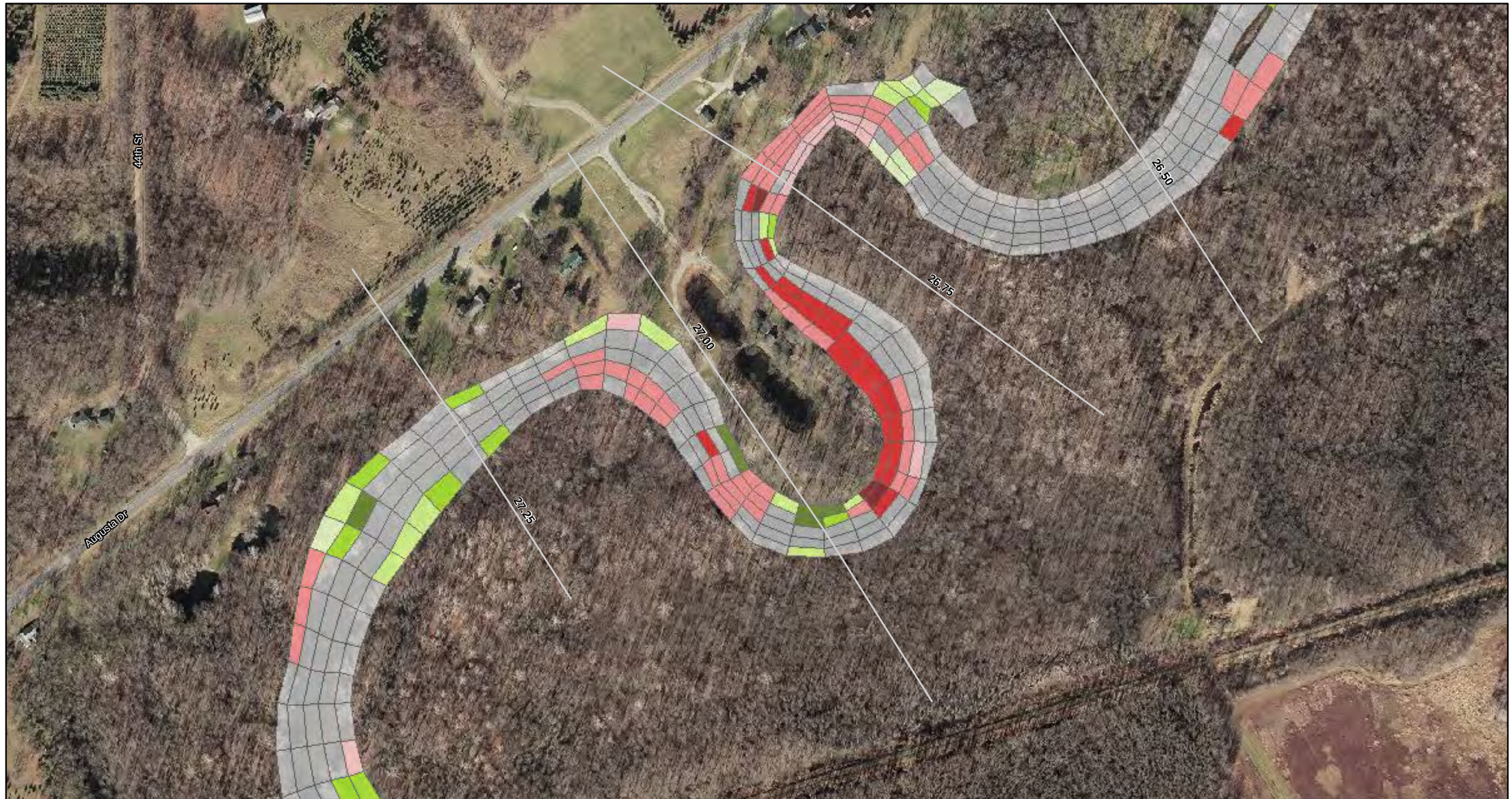
MP 25.55 - MP 26.40

SHEET 33 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 26.40 - MP 27.45

SHEET 34 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Sedimentation_Rate2_May_2011.mxd

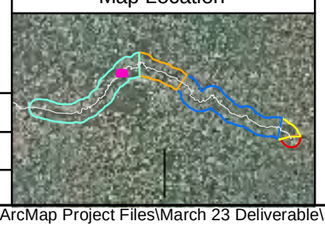
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 27.45 - MP 28.10

SHEET 35 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Sedimentation_Rate2_May_2011.mxd

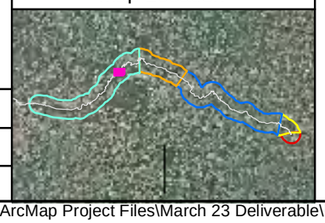
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 28.05 - MP 28.85

SHEET 36 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

Clinton St
Clinton St
Chestnut St
Webster St
Church St
Fayette St
Cass St
Cherry St
Lincoln St
28.75
29.00
29.25
29.50
Augusta Climax Rd
Fort Custer Rec Area Access

ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 28.85 - MP29.55

SHEET 37 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

29.50

29.75

Fort Custer Rec Area Service

Fort Custer Rec Area Access

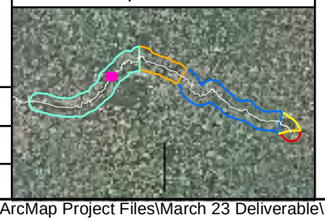
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30.25

ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 29.50 - MP29.95

SHEET 38 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

30.00

30.25

30.50

30.75

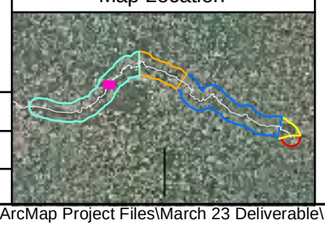
Fort Custer Rec Area BAS

Fort Custer Rec Area Access

ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 29.95 - MP 30.80

SHEET 39 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 30.75 - MP 31.25

SHEET 40 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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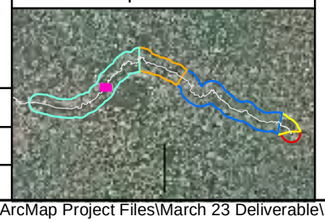
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 31.25 - MP 31.70

SHEET 41 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
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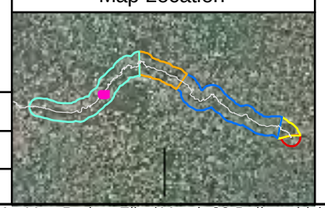
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 31.65 - MP 32.25

SHEET 42 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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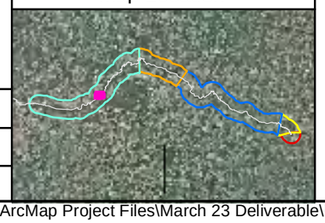
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 32.25 - MP 33.10

SHEET 43 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 33.10 - MP 33.70

SHEET 44 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 33.70 - MP 34.70

SHEET 45 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

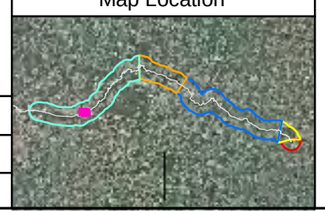
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Aerial Photography Date: November 2011



Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 34.70 - MP 35.75

SHEET 46 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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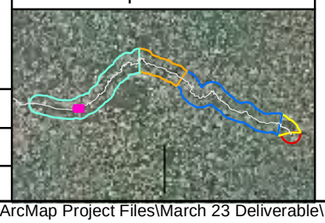
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

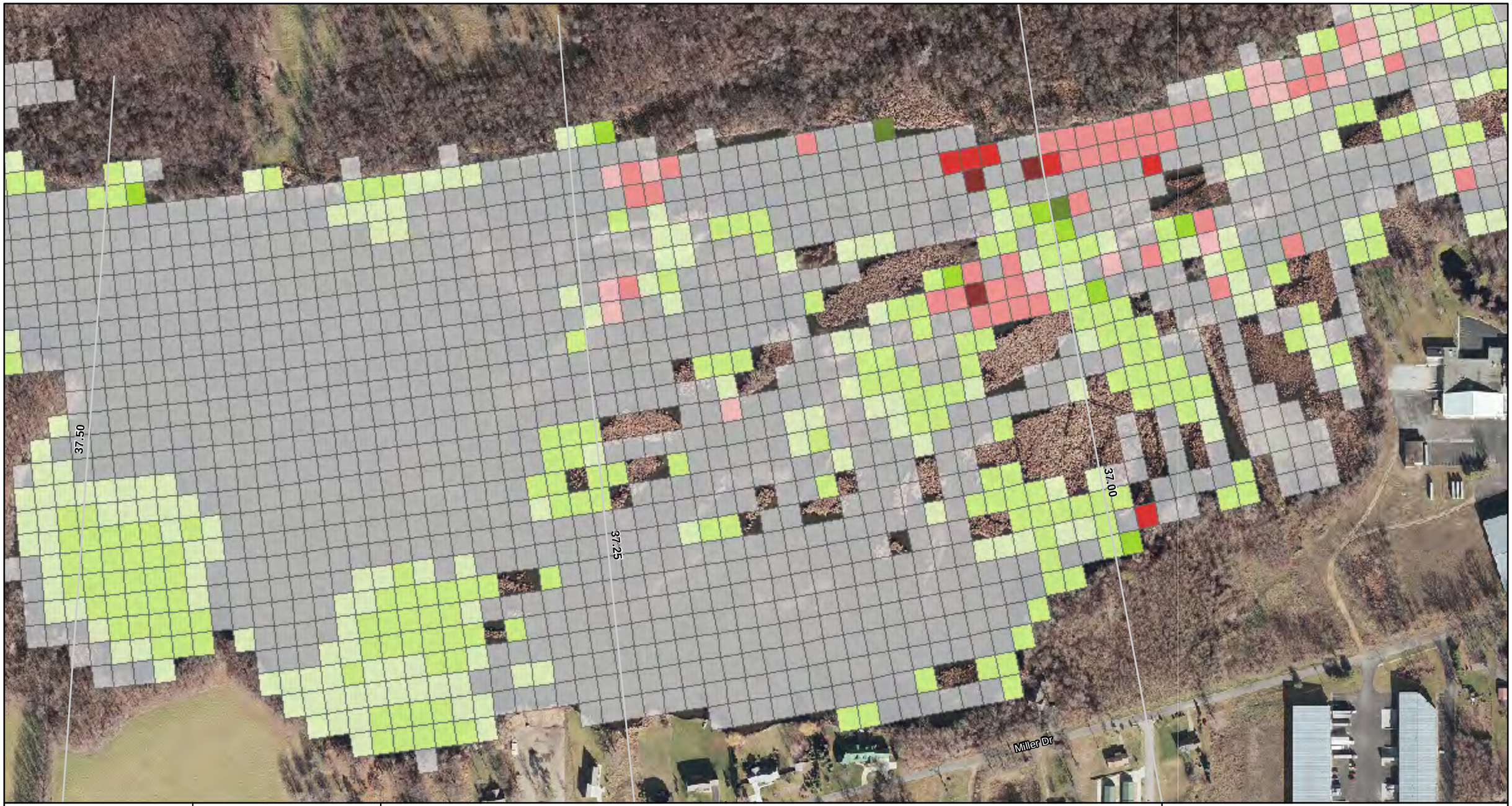
MP 35.75 - MP 36.80

SHEET 47 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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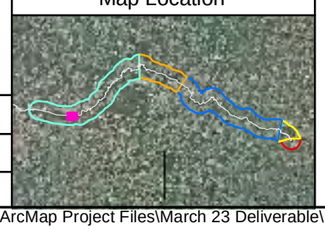
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 36.80 - MP 37.55

SHEET 48 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

38.25

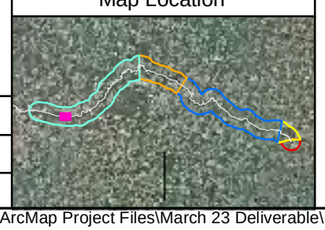
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37.75

ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

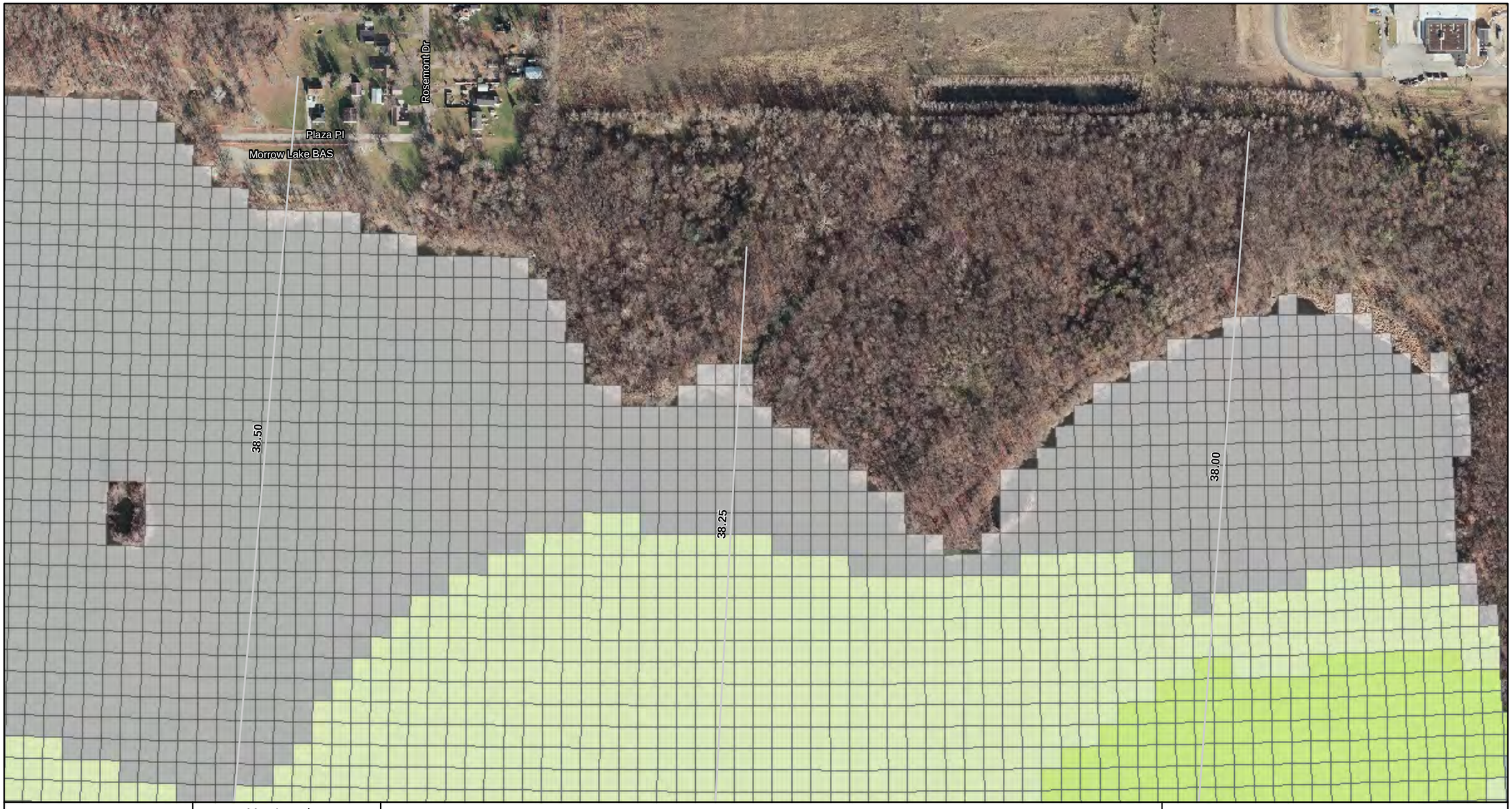
MP 37.55 - MP 38.30

SHEET 49 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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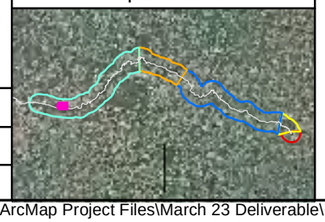
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 37.80 - MP 38.60N

SHEET 50 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

38.50

38.25

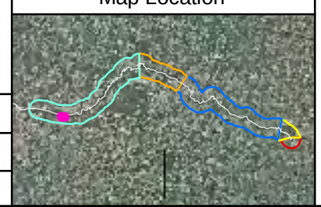
38.00

Lyth Rd

ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 37.80 - MP 38.60S

SHEET 51 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Sedimentation_Rate2_May_2011.mxd

Aerial Photography Date: November 2011

39.00

38.50

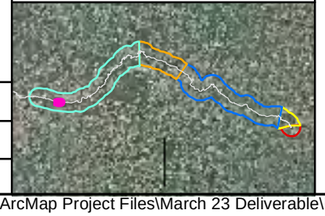
38.75

38.25

ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 38.25 - MP 39.00C

SHEET 52 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

Lawndale Ave

Plaza Pl

Morrow Lake BAS

39.25

39.00

38.75

38.50

ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

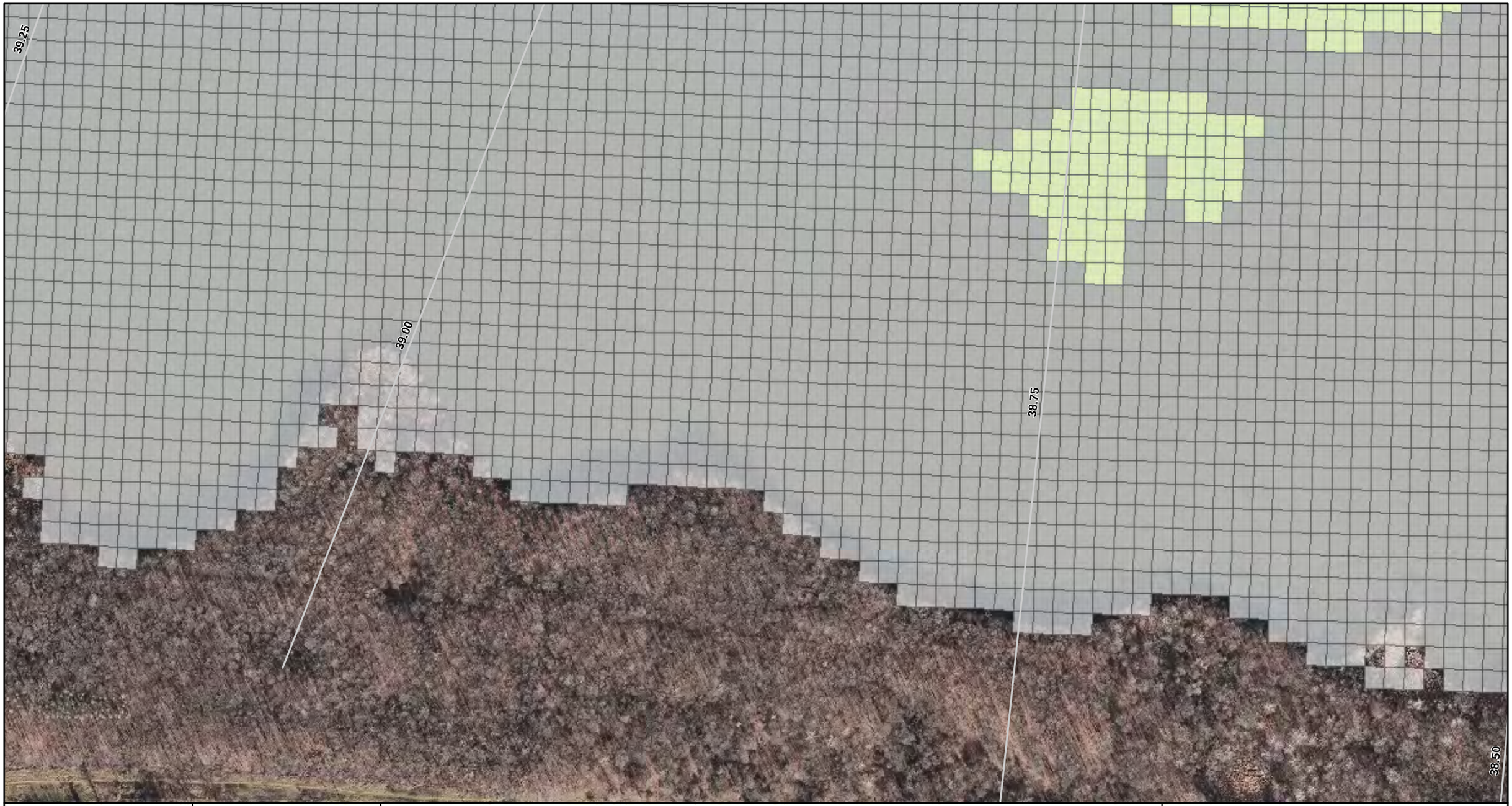
MP 38.50 - MP 39.25N

SHEET 53 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Sedimentation_Rate2_May_2011.mxd

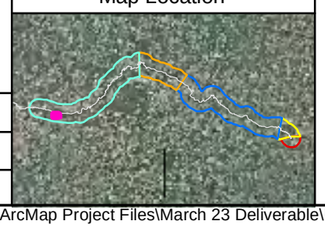
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 38.50 - MP 39.25S

SHEET 54 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Sedimentation_Rate2_May_2011.mxd

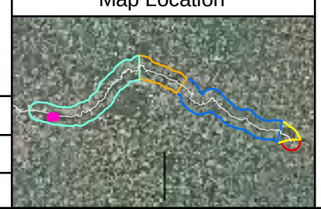
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 38.90 - MP 39.60S

SHEET 55 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 16 - MAY 23, 2011

MP 39.15 - MP 39.85

SHEET 56 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Sedimentation_Rate2_May_2011.mxd

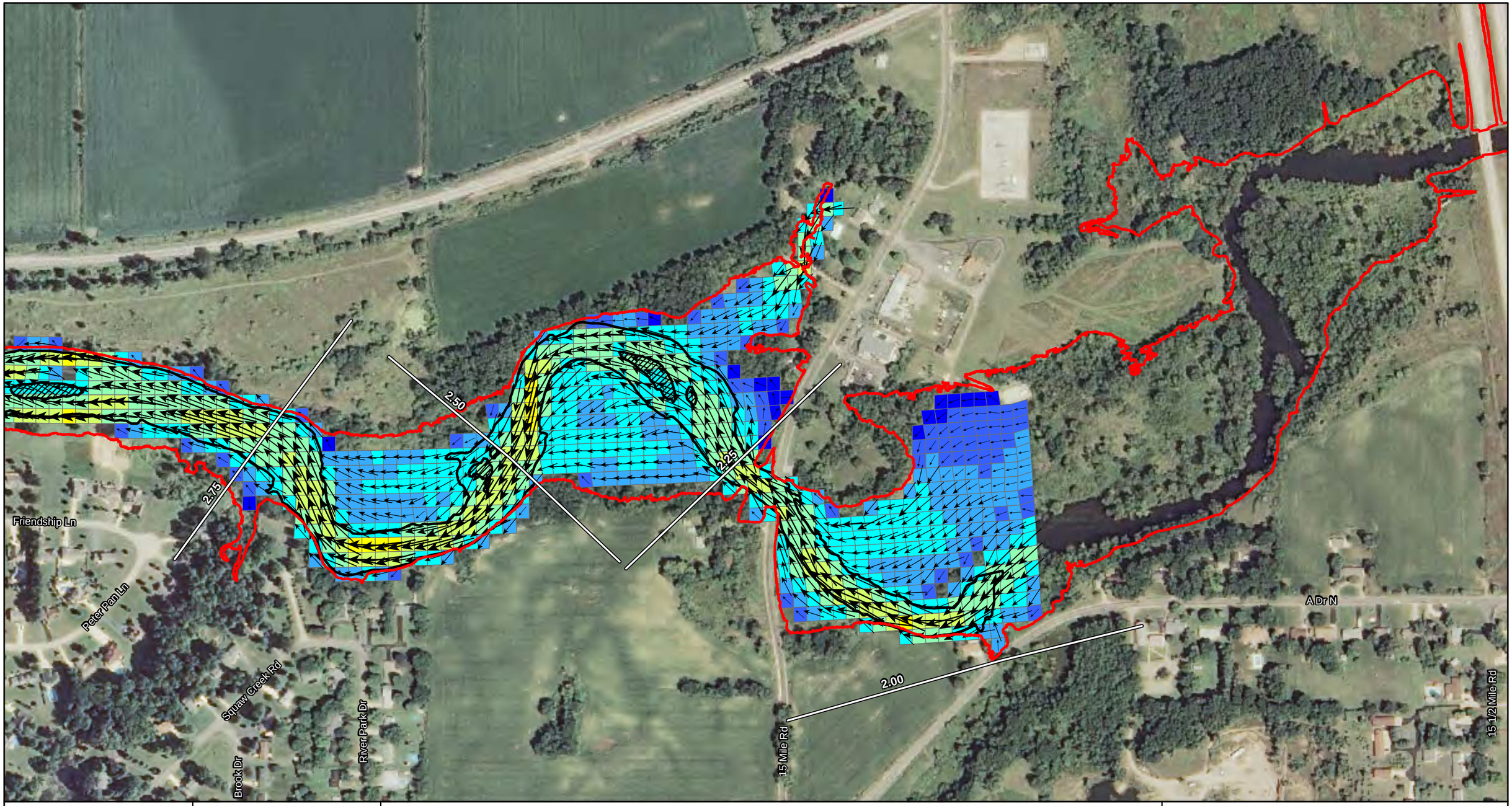
Aerial Photography Date: November 2011

Figure 5-15

Floodplain Grid: Velocity

May 27, 2011

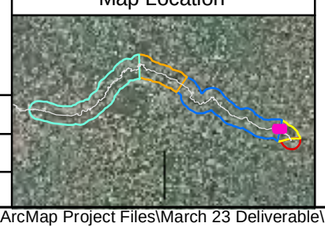
Sheets 1 through 45



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

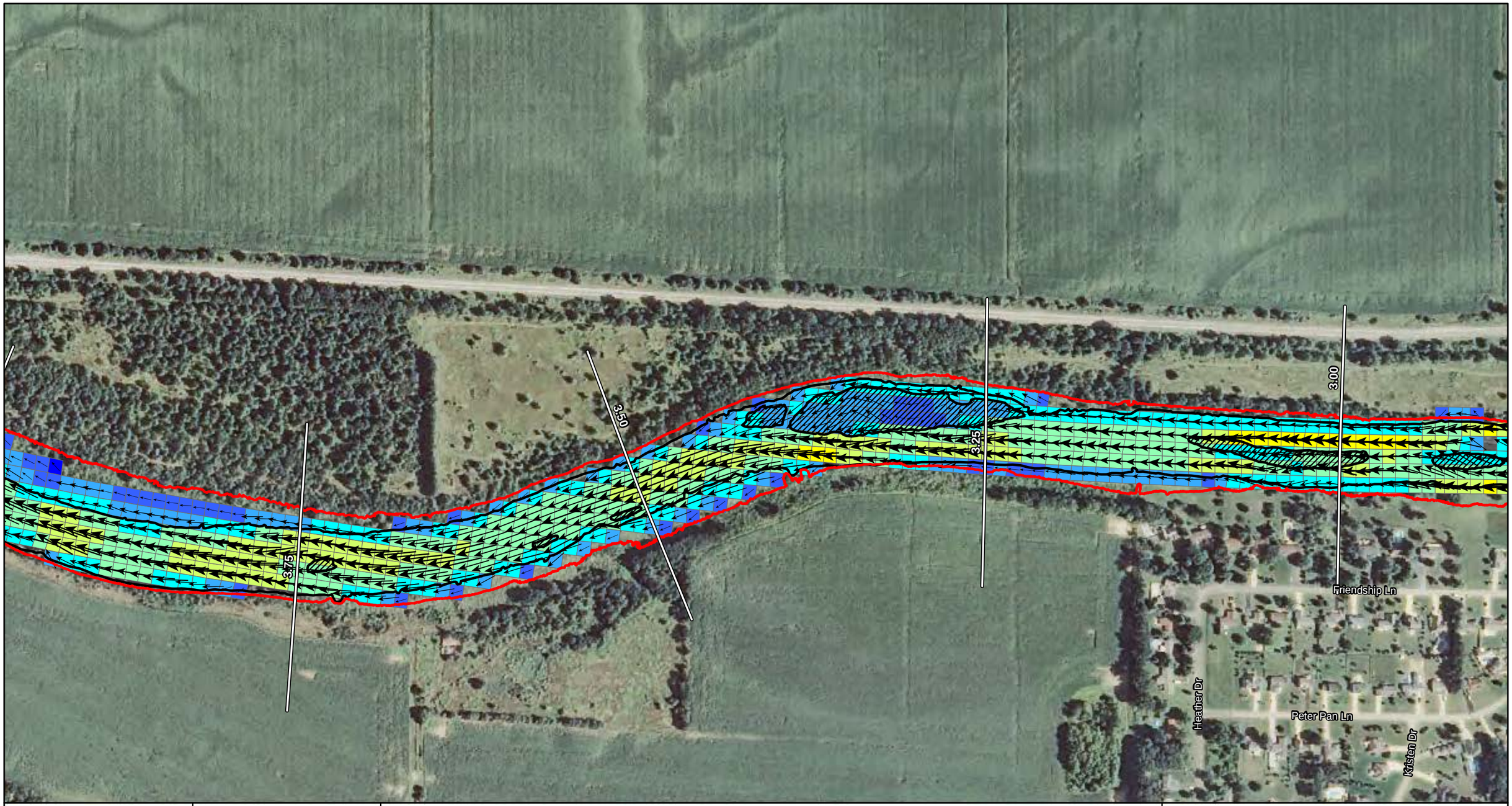
MP 01.88 - MP 02.91

SHEET 1 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May27_2011.mxd

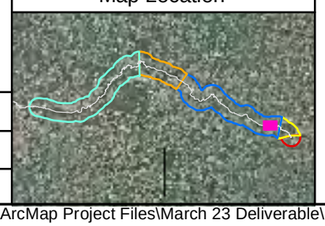
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

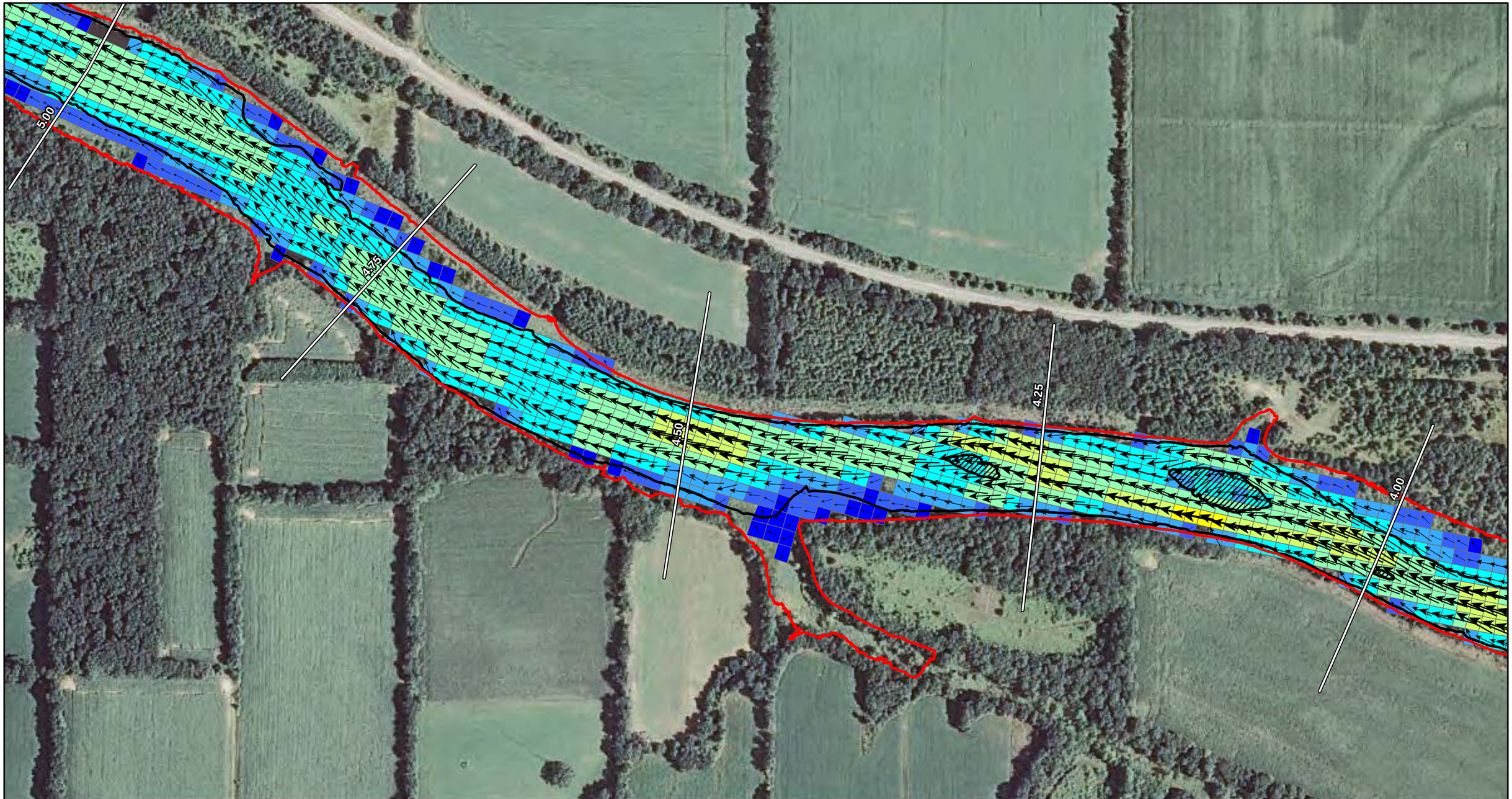
MP 01.88 - MP 02.91

SHEET 2 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

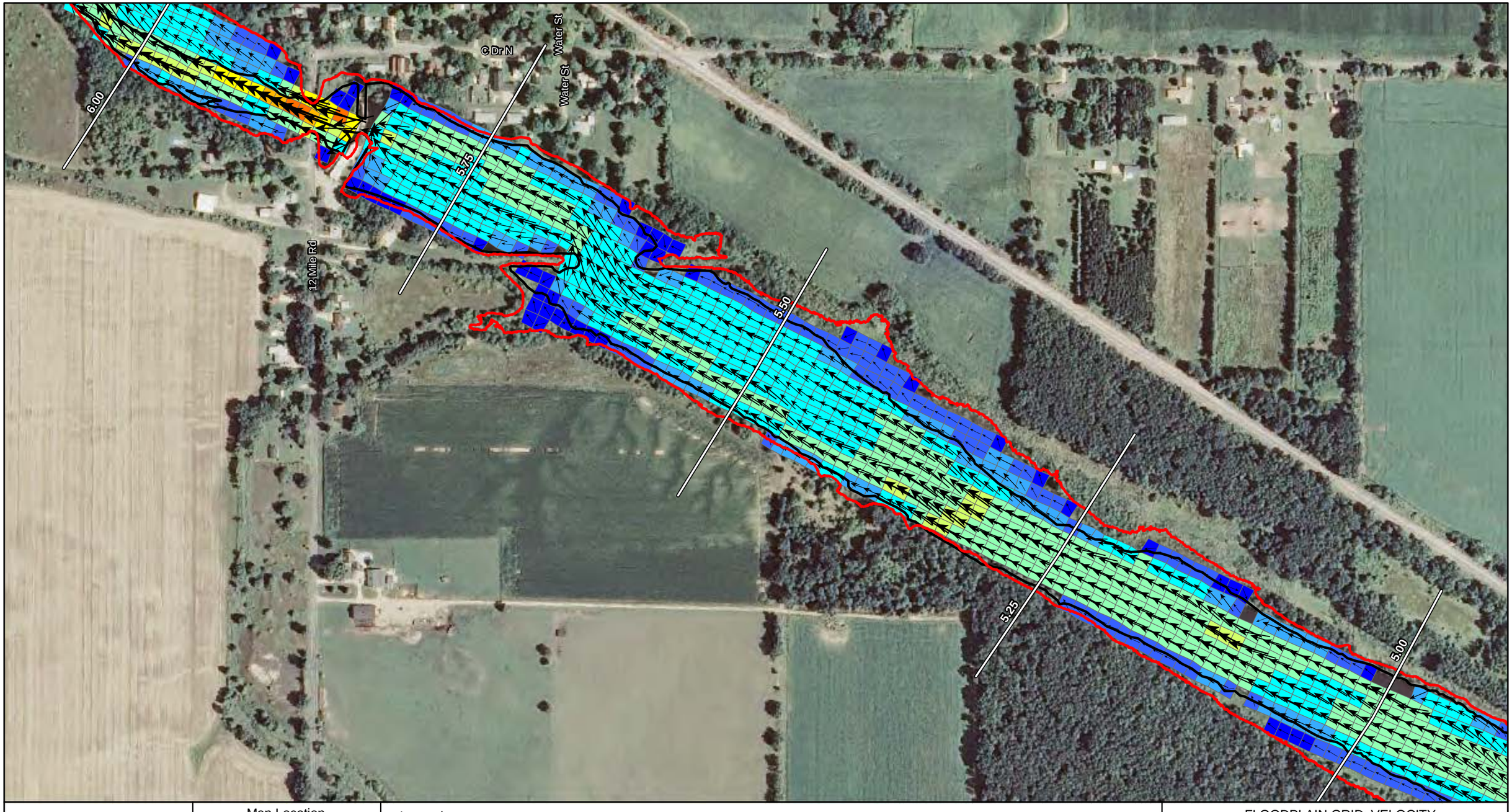
MP 03.93 - MP 04.98

SHEET 3 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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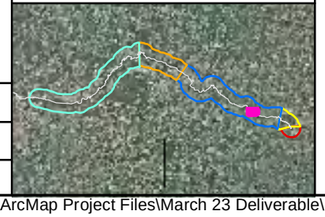
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

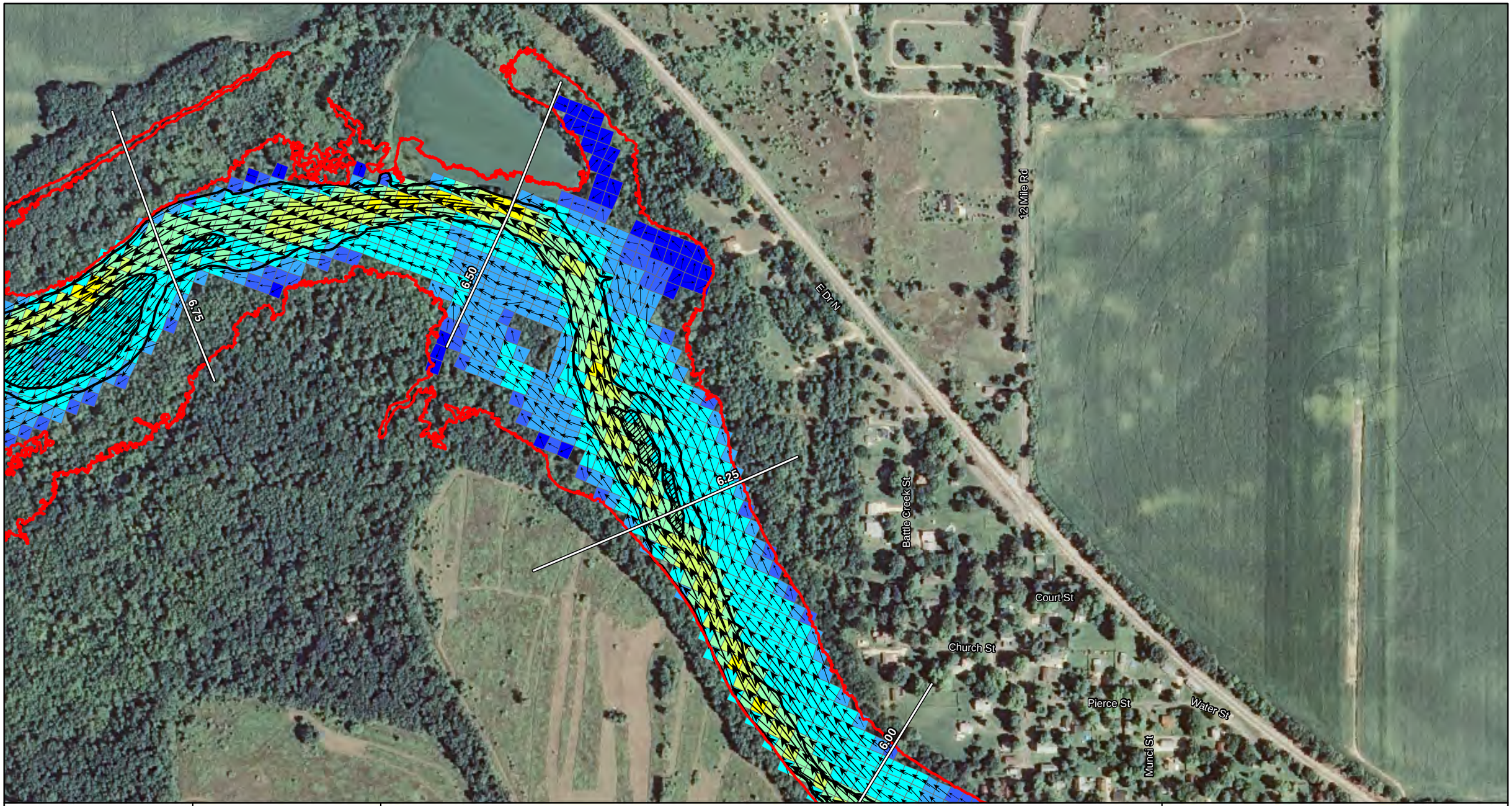
MP 04.98 - MP 06.03

SHEET 4 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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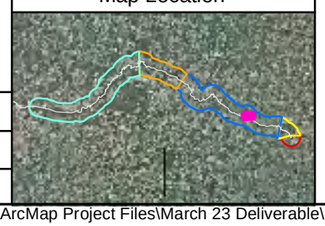
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

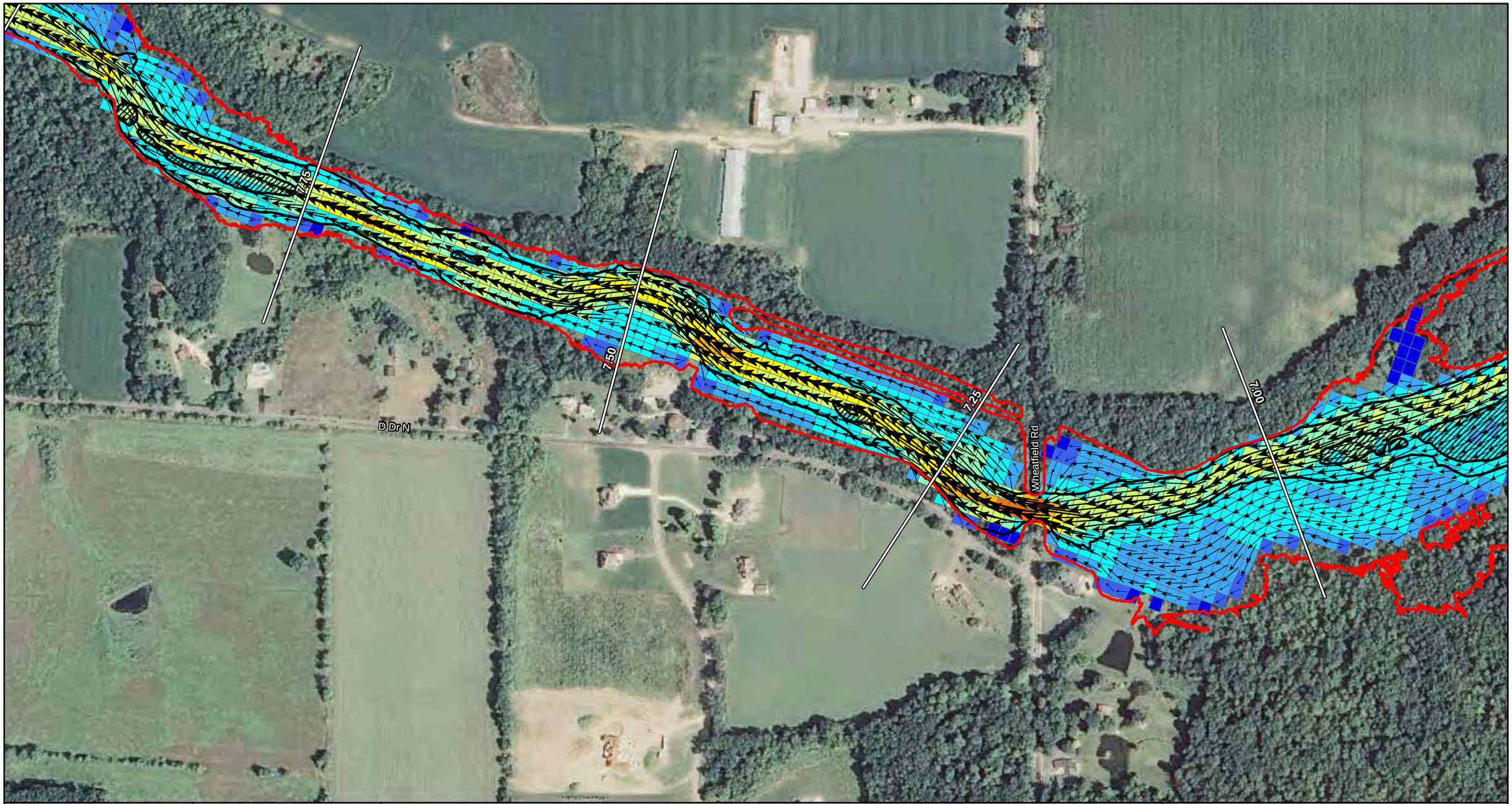
MP 06.03 - MP 06.85

SHEET 5 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

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- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

MP 06.85 - MP 07.95

SHEET 6 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009

9.00

8.75

8.50

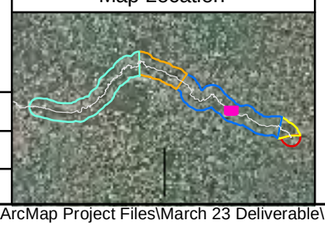
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8.00

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

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- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

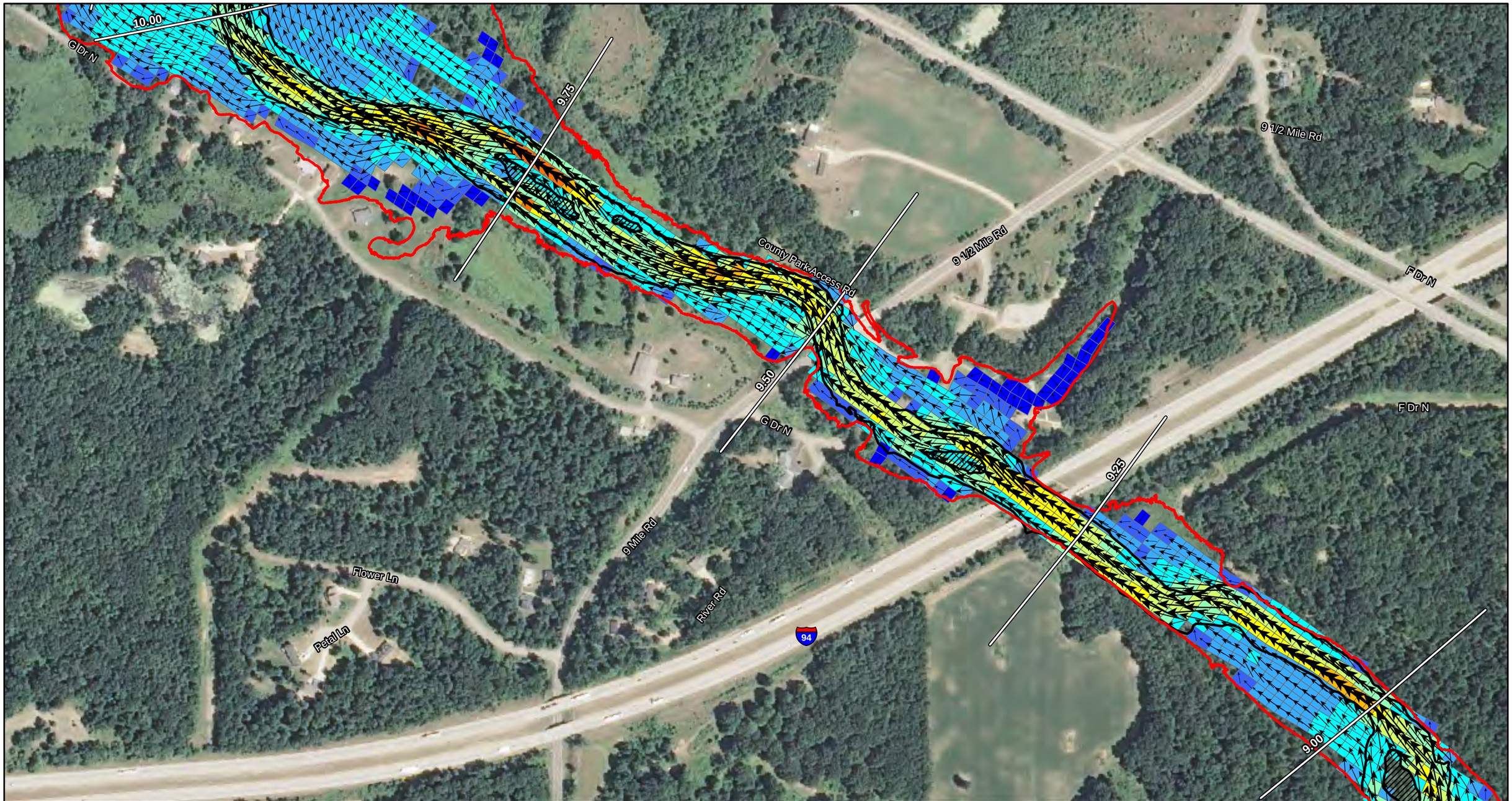
MP 07.95 - MP 08.93

SHEET 7 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

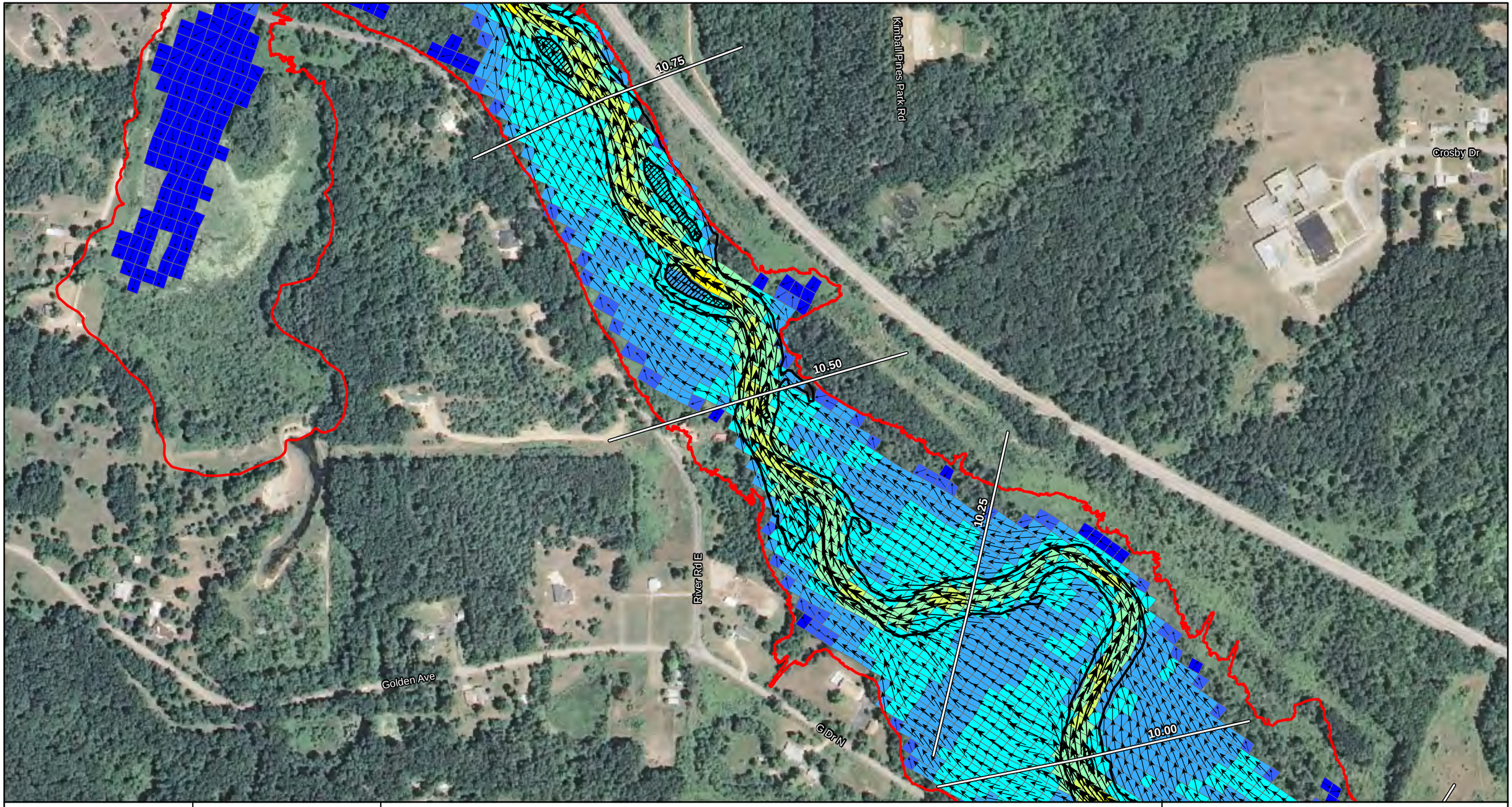
MP 08.93 - MP 10.00

SHEET 8 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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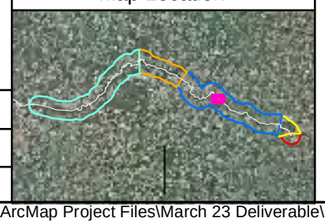
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
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- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

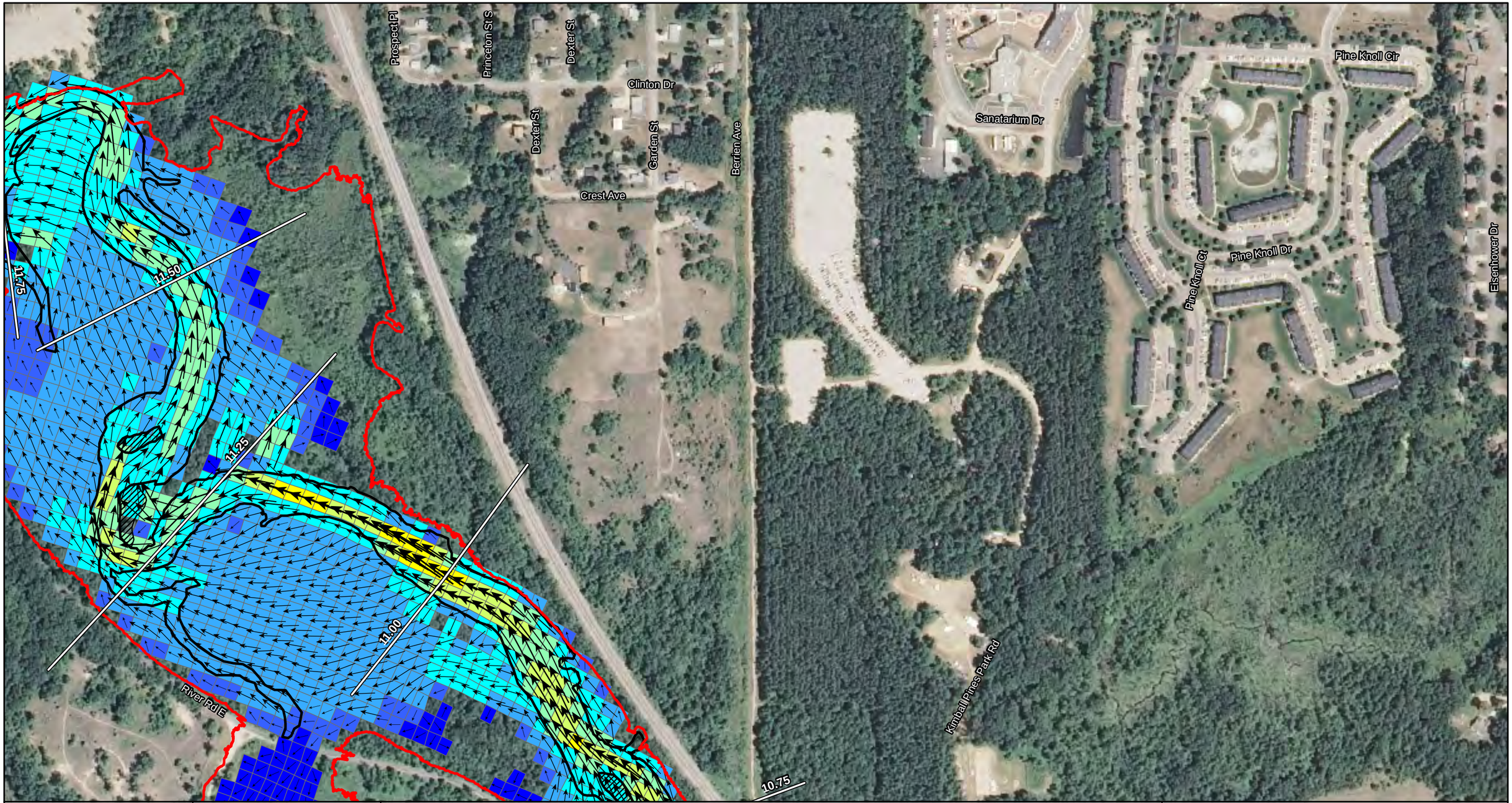
MP 10.00 - MP 10.80

SHEET 9 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May27_2011.mxd

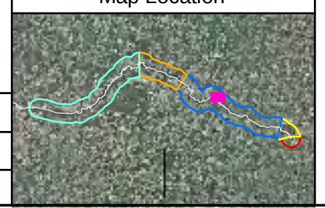
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

MP 10.80 - MP 11.70

SHEET 10 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009

Inn Rd
Lathrop Ave
Caine St
Vale St
James St
Greble St
Hannah St
Post Ave
Academy St
Kingman Ave E
James St
Vale St
Columbia Ave E
13.25
12.15
12.25
12.50
12.00
11.75
11.50
Leonhard Wood
Raymond Rd S
River Rd E

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
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cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

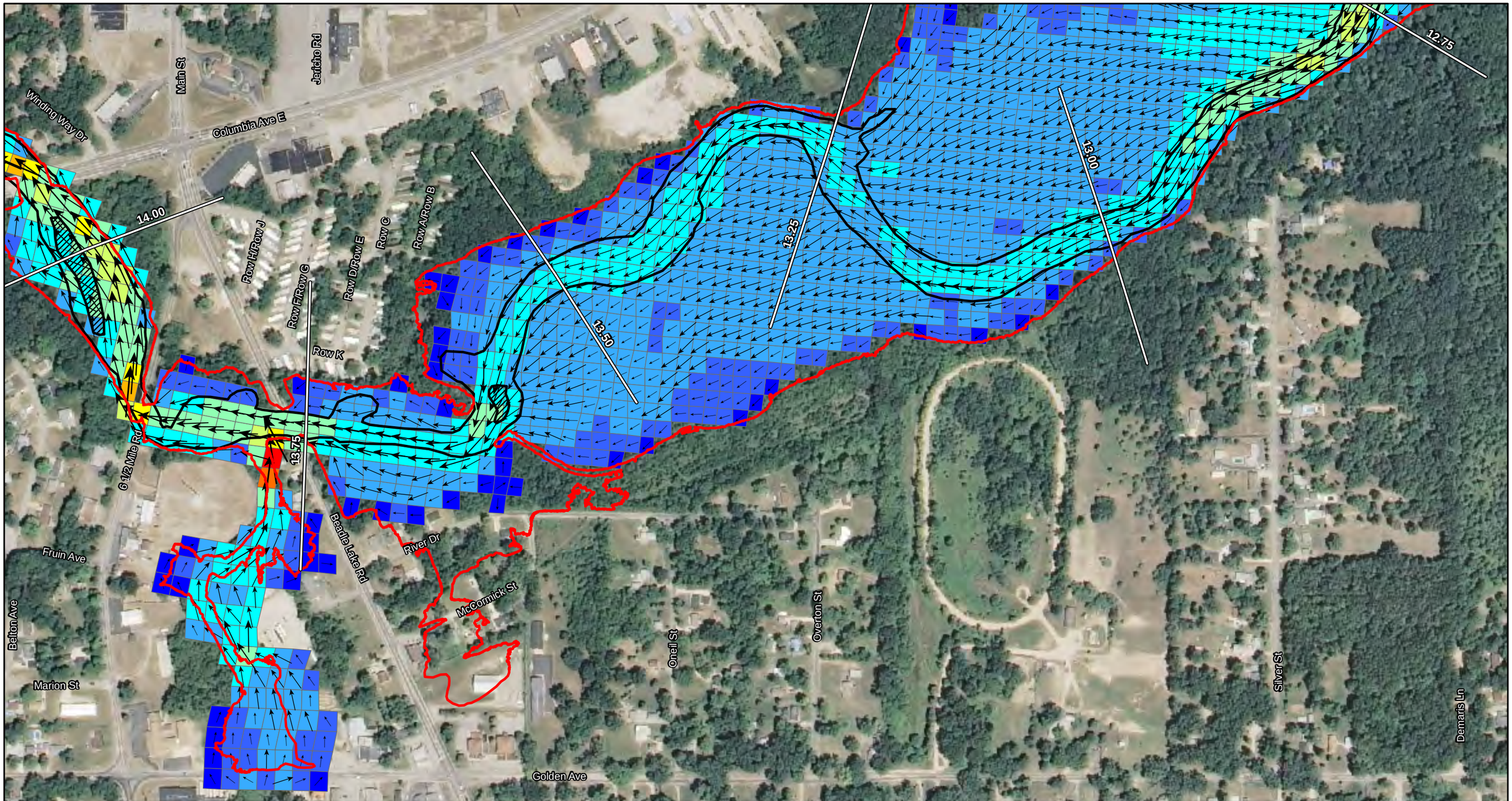
MP 11.70 - MP 12.77

SHEET 11 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May27_2011.mxd

Aerial Photography Date: July & August 2009



Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
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N

0 175 350 700
Scale in Feet

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

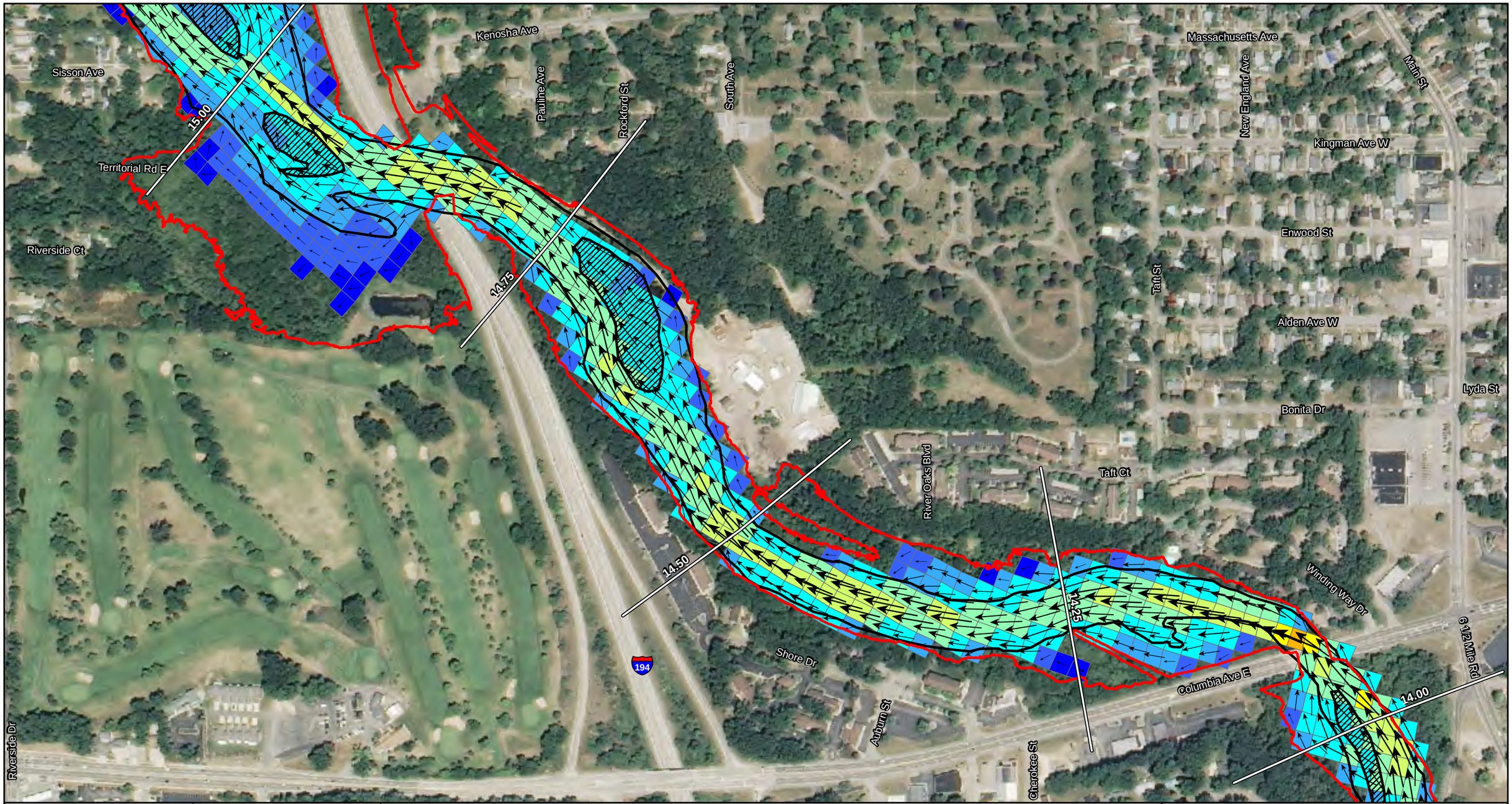
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SHEET 12 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
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- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
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cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

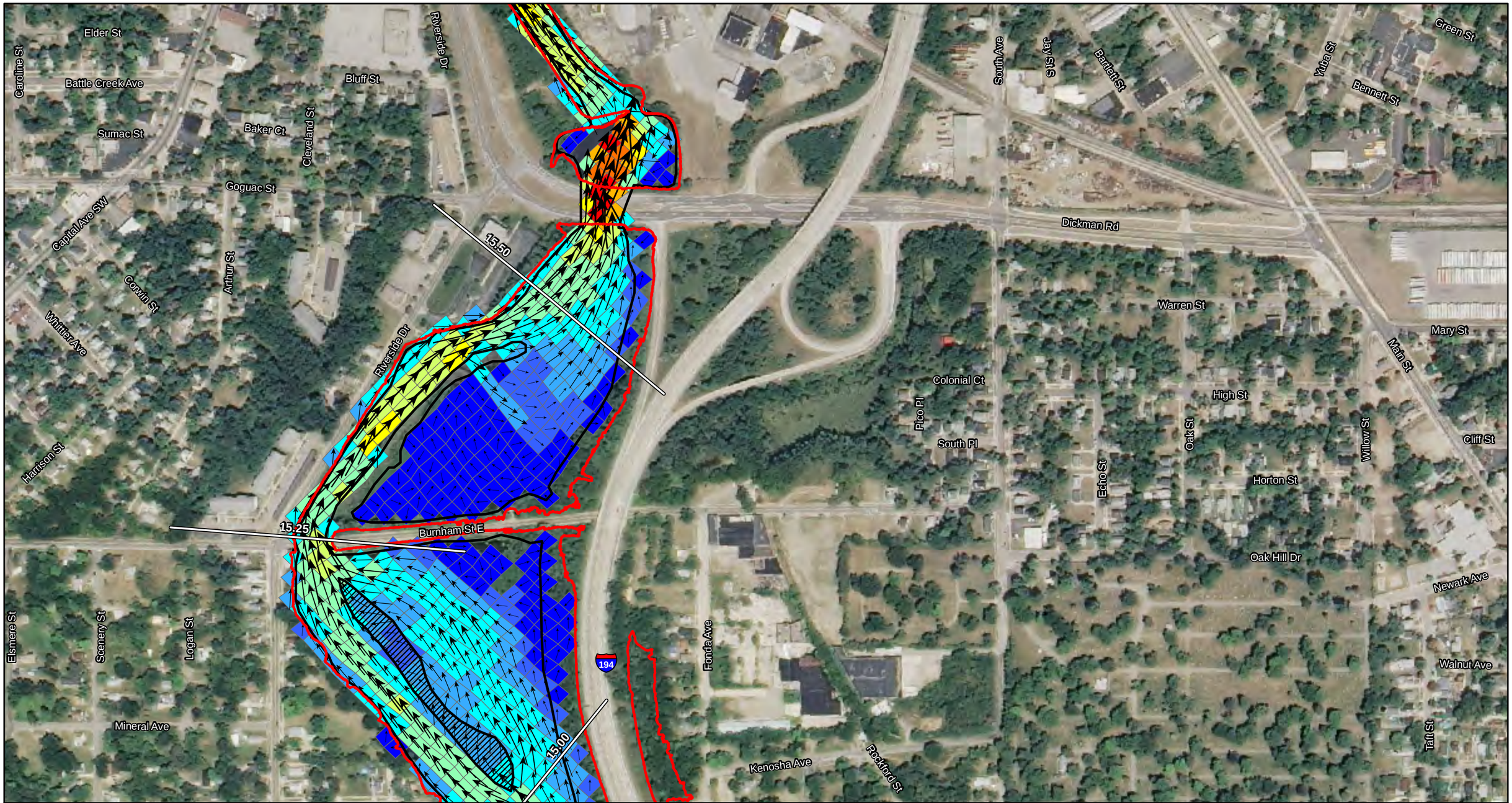
MP 14.00 - MP 15.05

SHEET 13 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
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cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

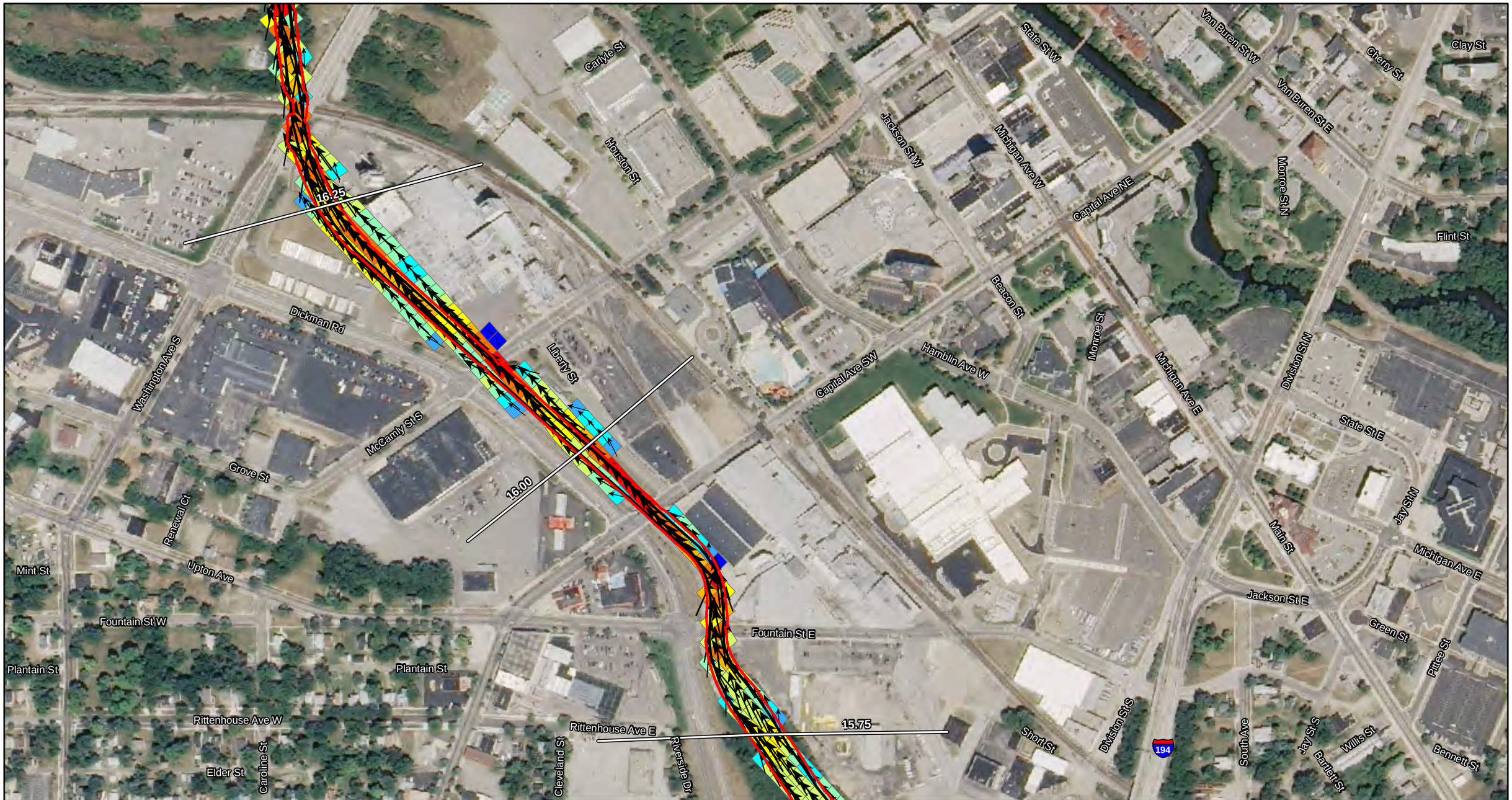
MP 15.05 - MP 15.71

SHEET 14 OF 45

ENBRIDGE LINE 6B MP 608
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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
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ft/sec = Feet Per Second
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N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

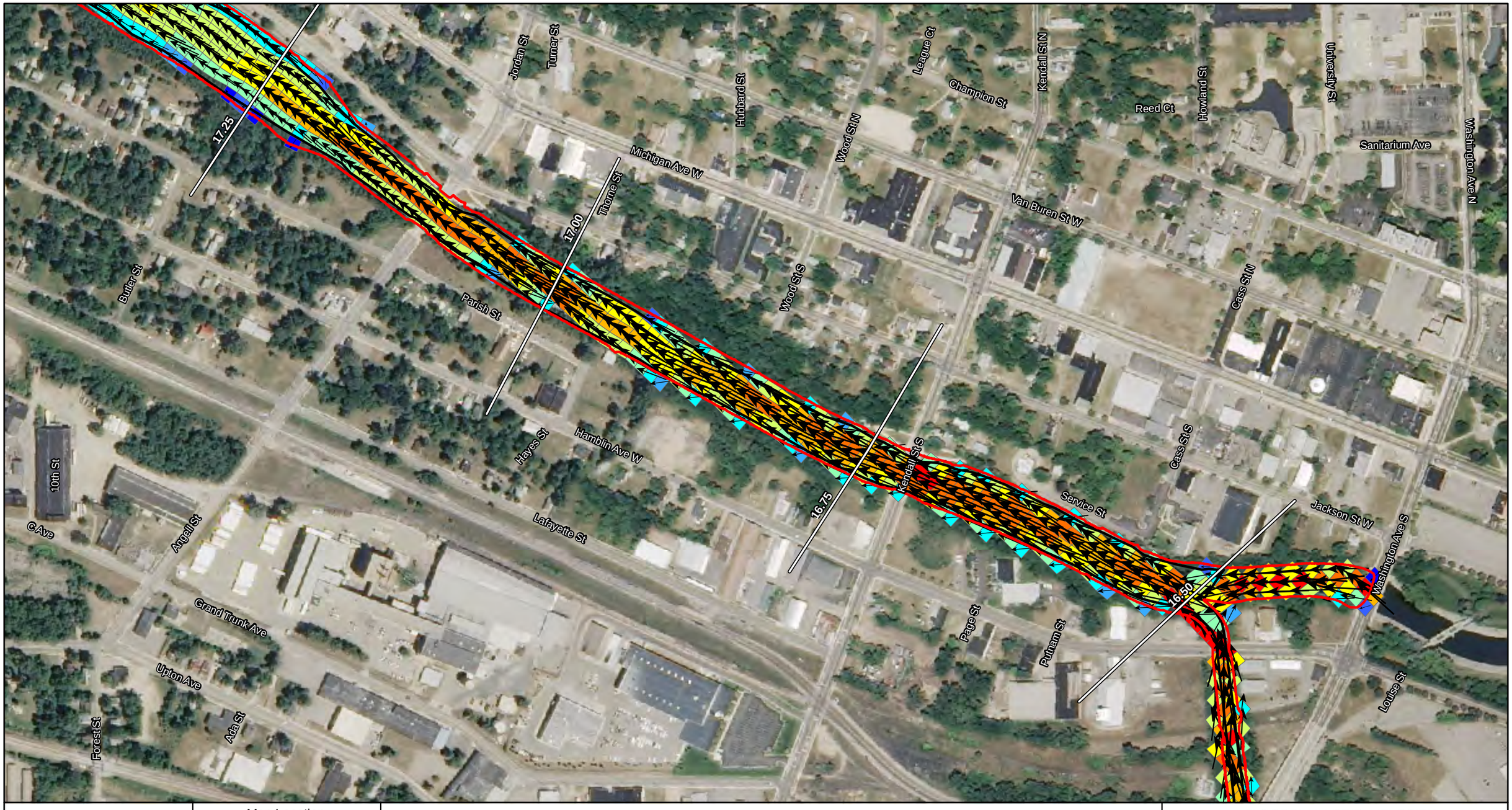
MP 15.71 - MP 16.38

SHEET 15 OF 45

ENBRIDGE LINE 6B MP 608
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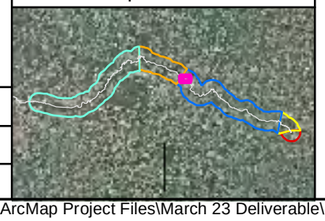
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

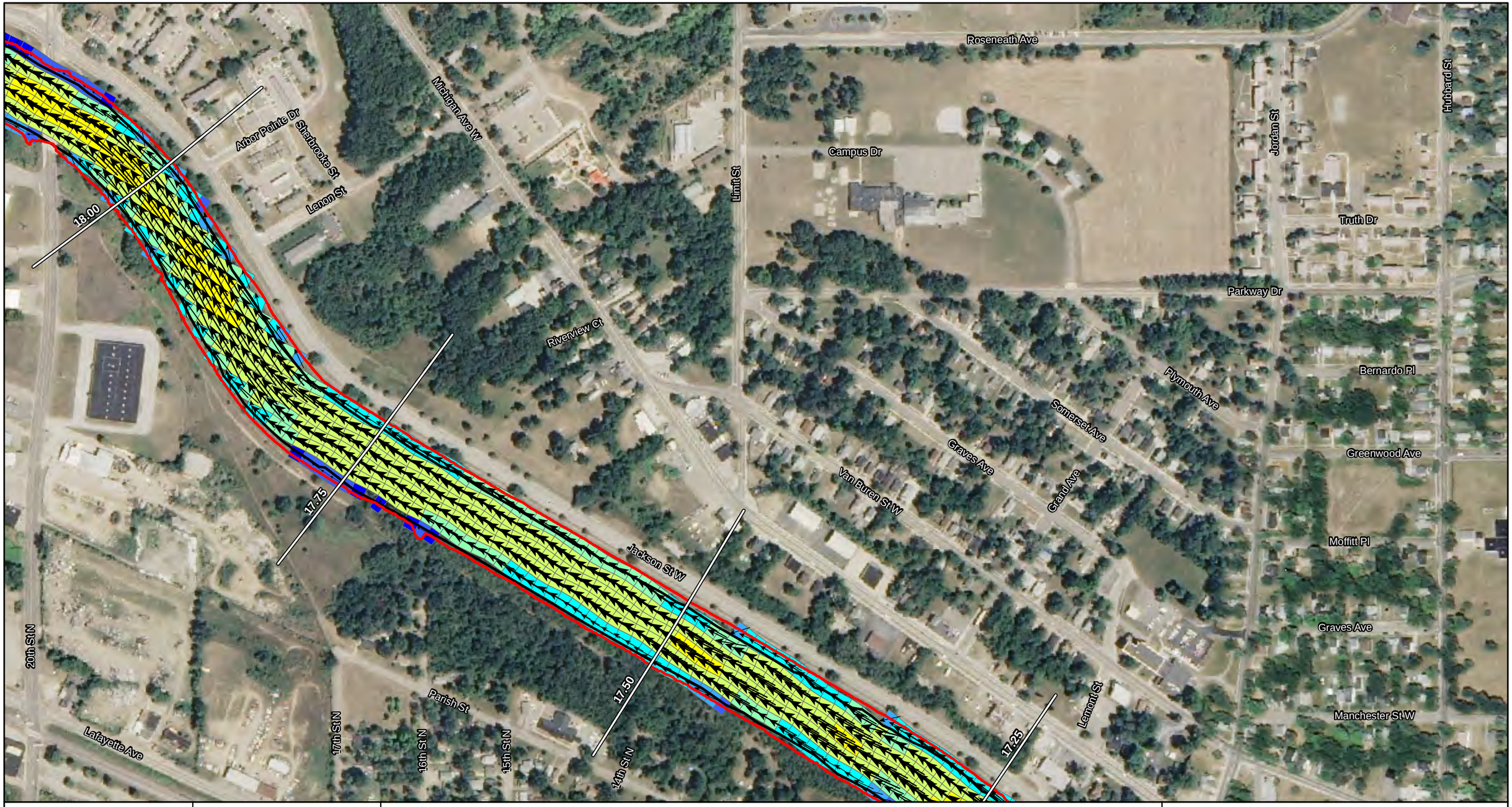
MP 16.38 - MP 17.30

SHEET 16 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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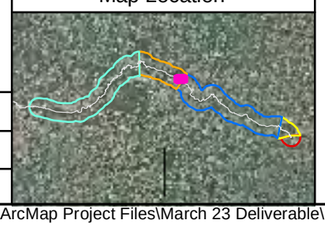
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
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- Flow Direction and Relative Magnitude
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ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

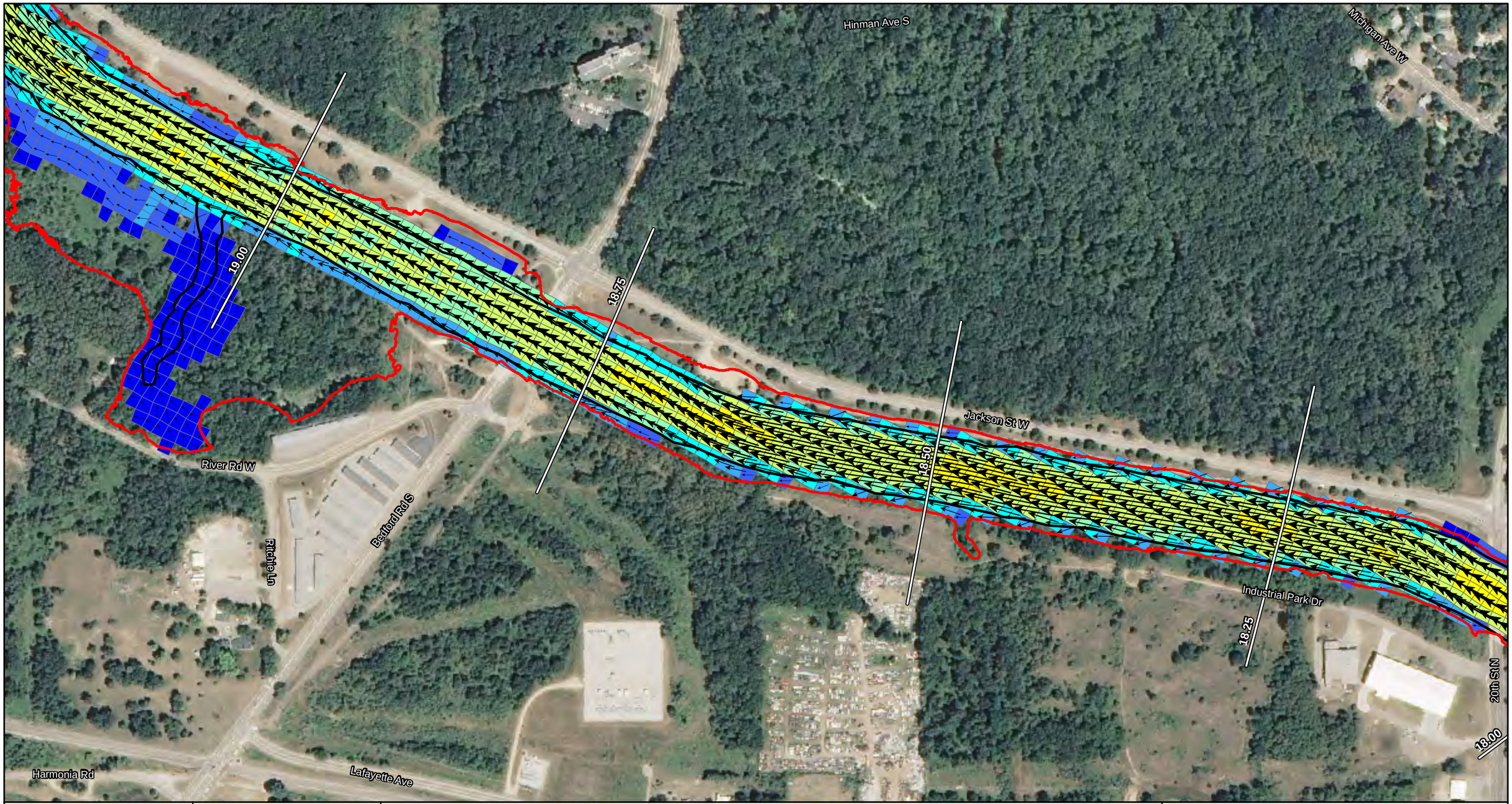
MP 17.30 - MP 18.11

SHEET 17 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

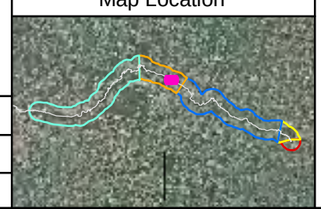
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Aerial Photography Date: July & August 2009



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
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N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

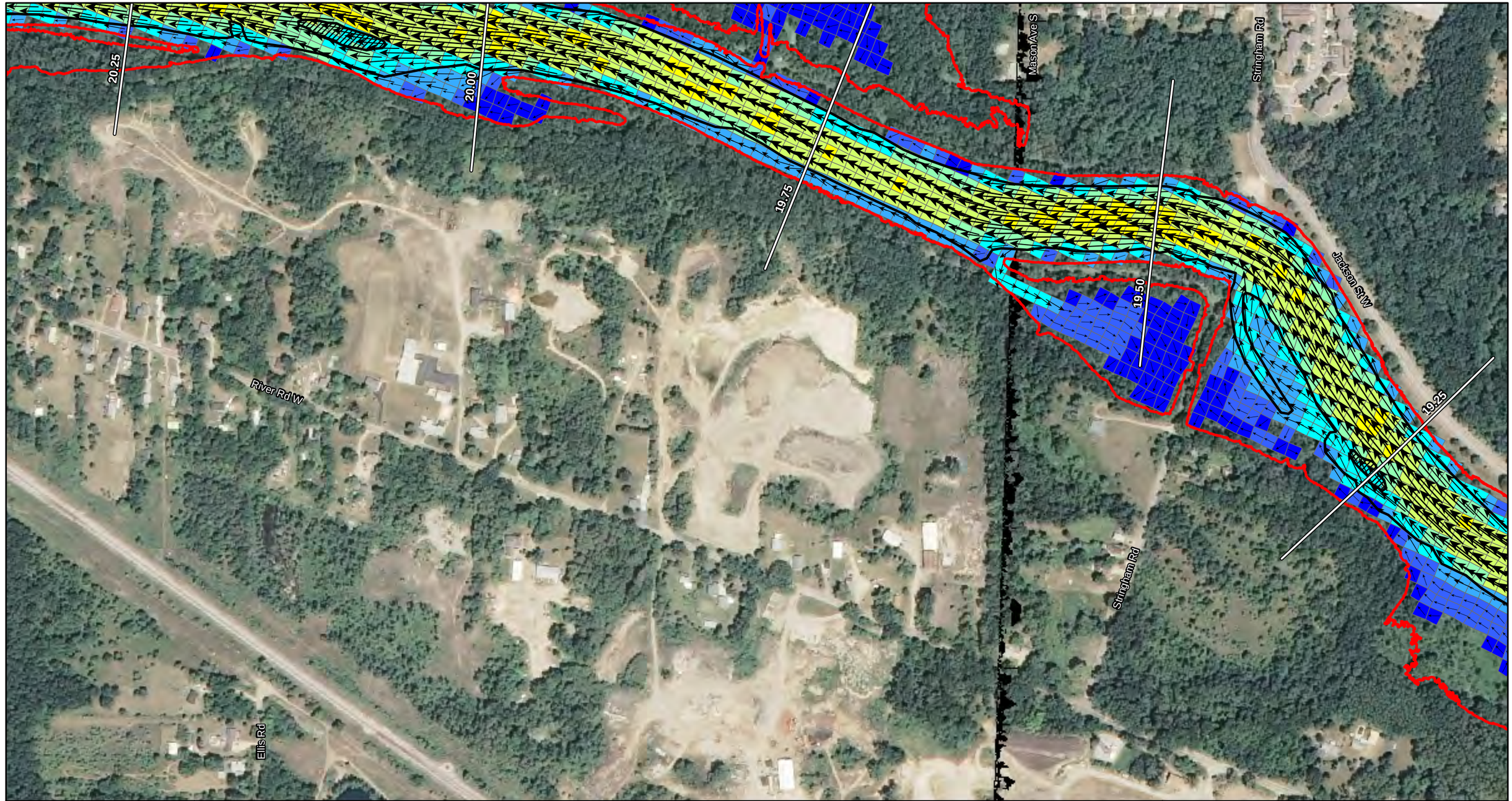
MP 18.11 - MP 19.18

SHEET 18 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
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N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

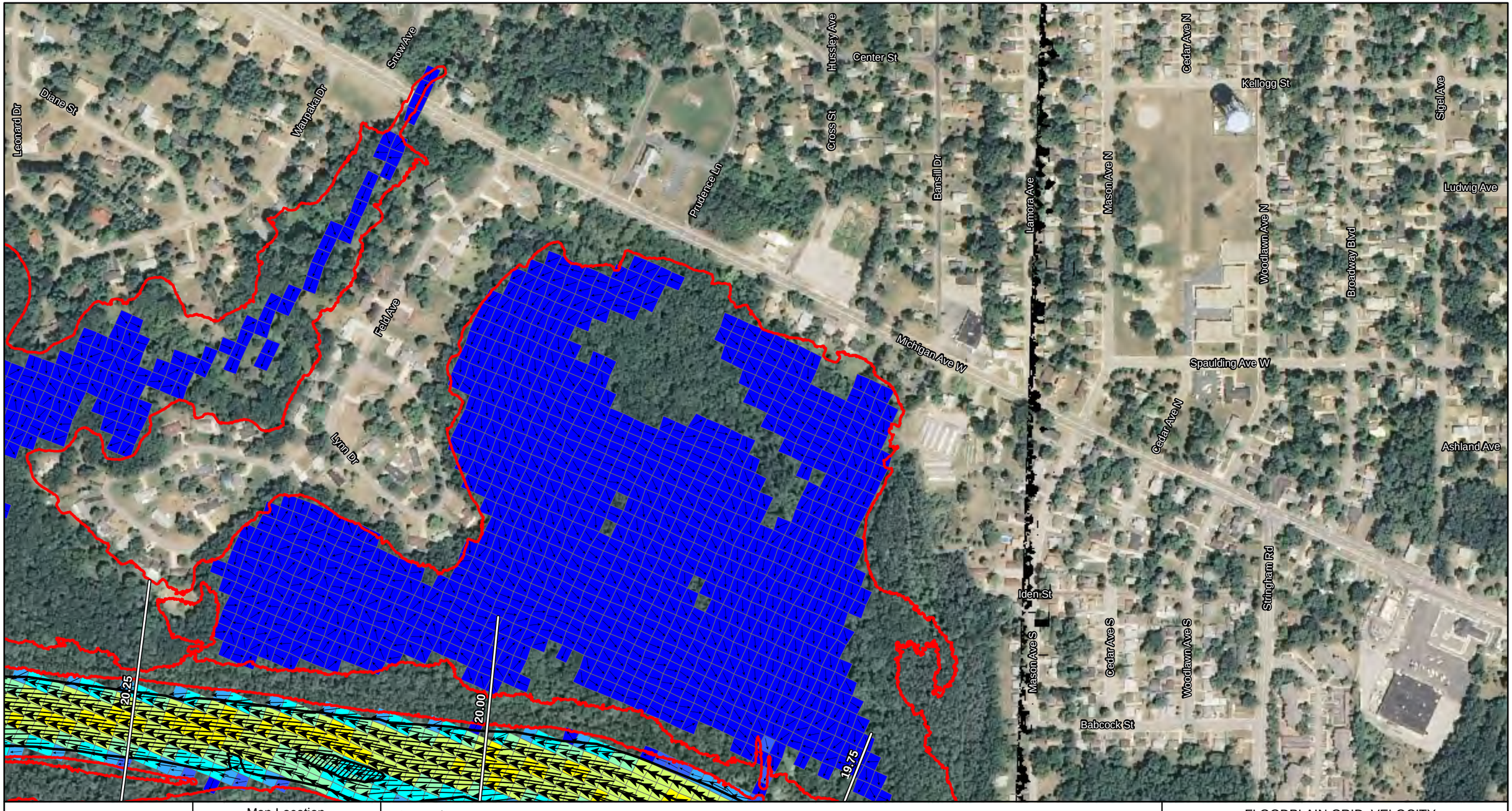
MP 19.18 - MP 20.00

SHEET 19 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May27_2011.mxd

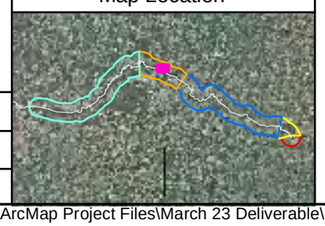
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
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0 175 350 700

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FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

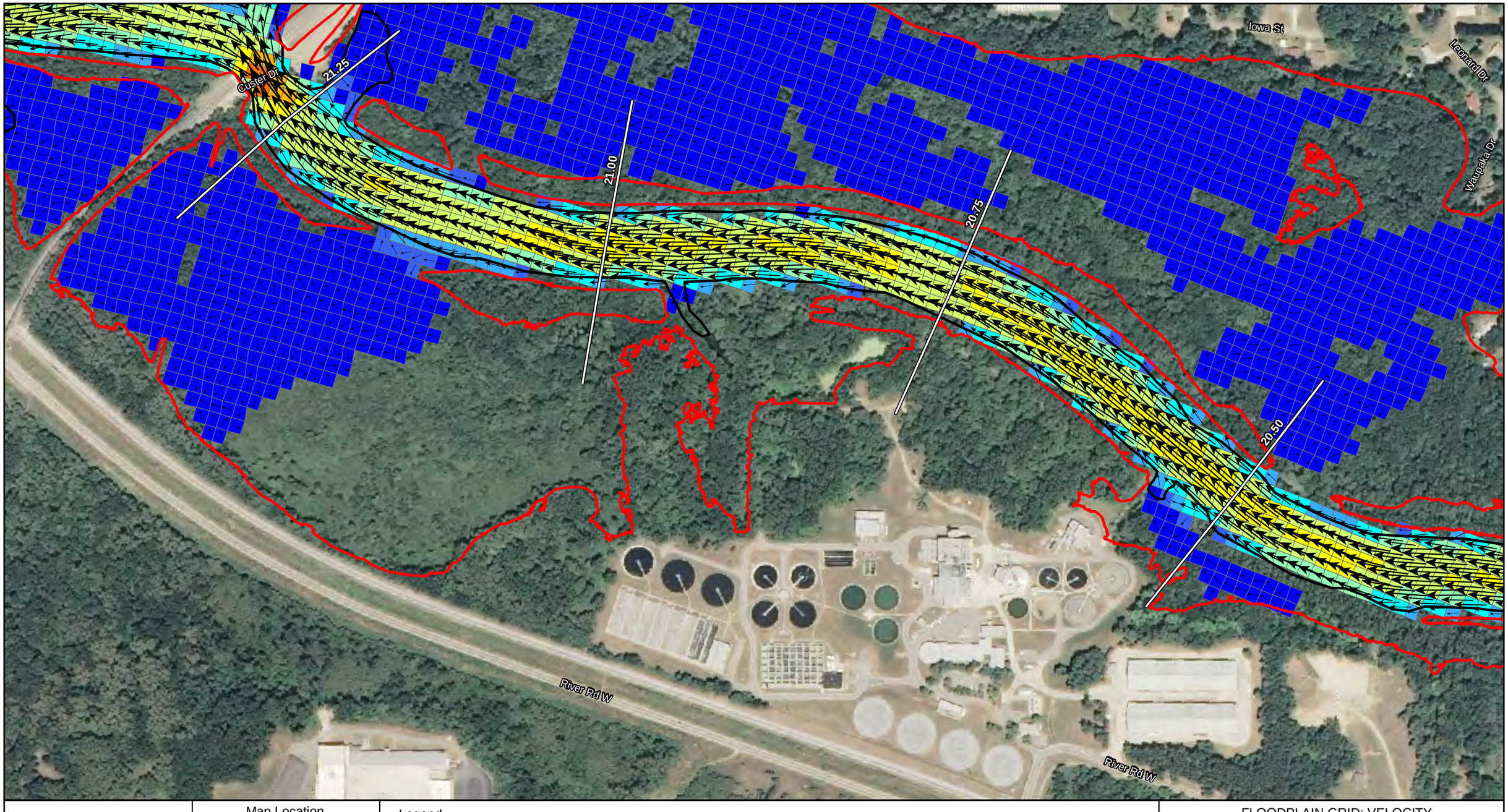
MP 20.00 - MP 20.32

SHEET 20 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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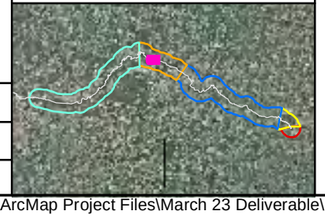
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
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Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
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N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

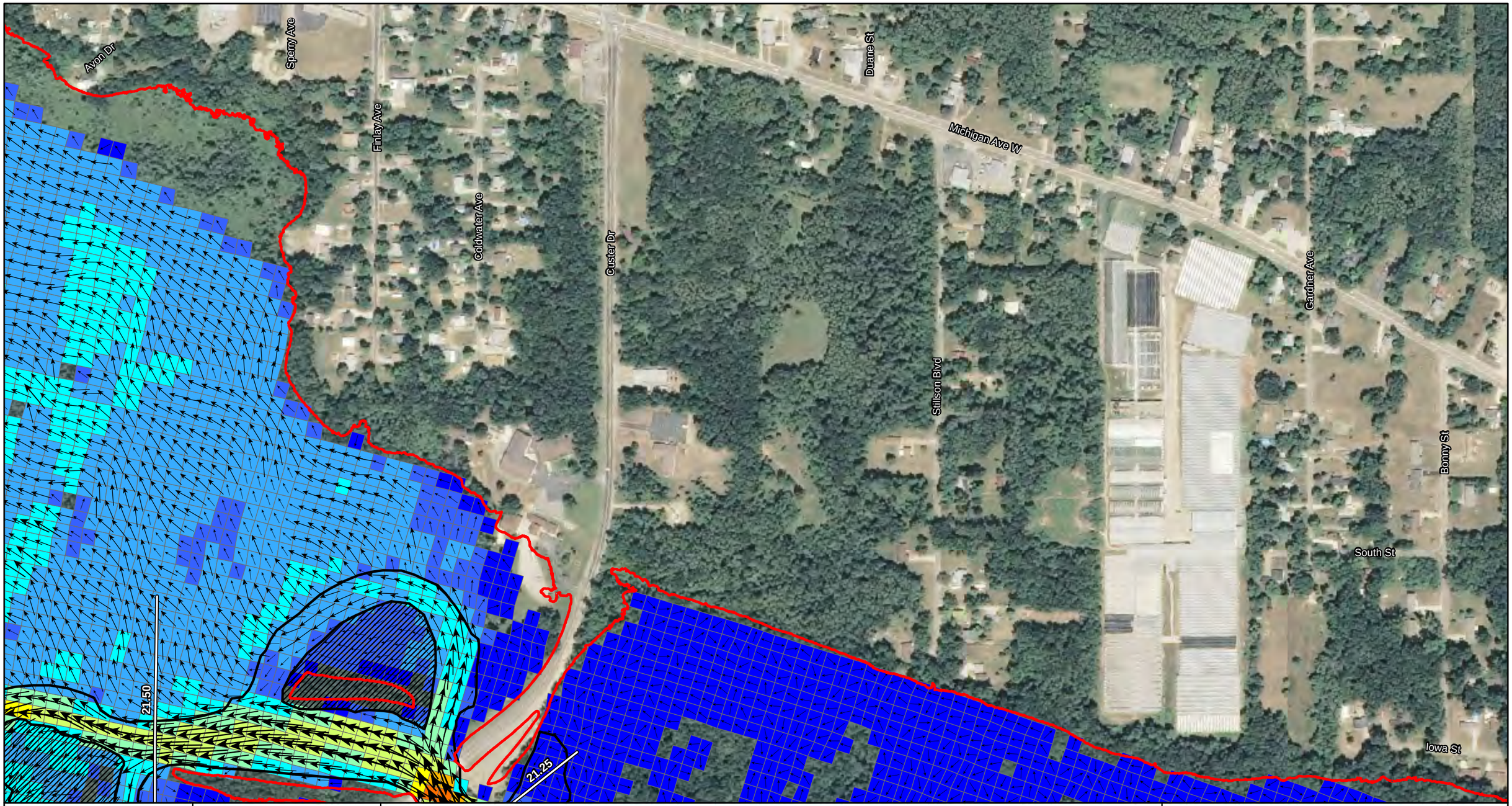
MP 20.32 - MP 21.36

SHEET 21 OF 45

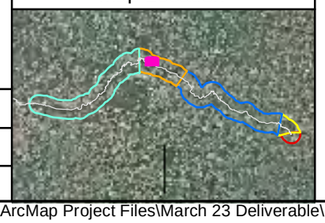
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May27_2011.mxd

Aerial Photography Date: July & August 2009



Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
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- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
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0 175 350 700
Scale in Feet

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

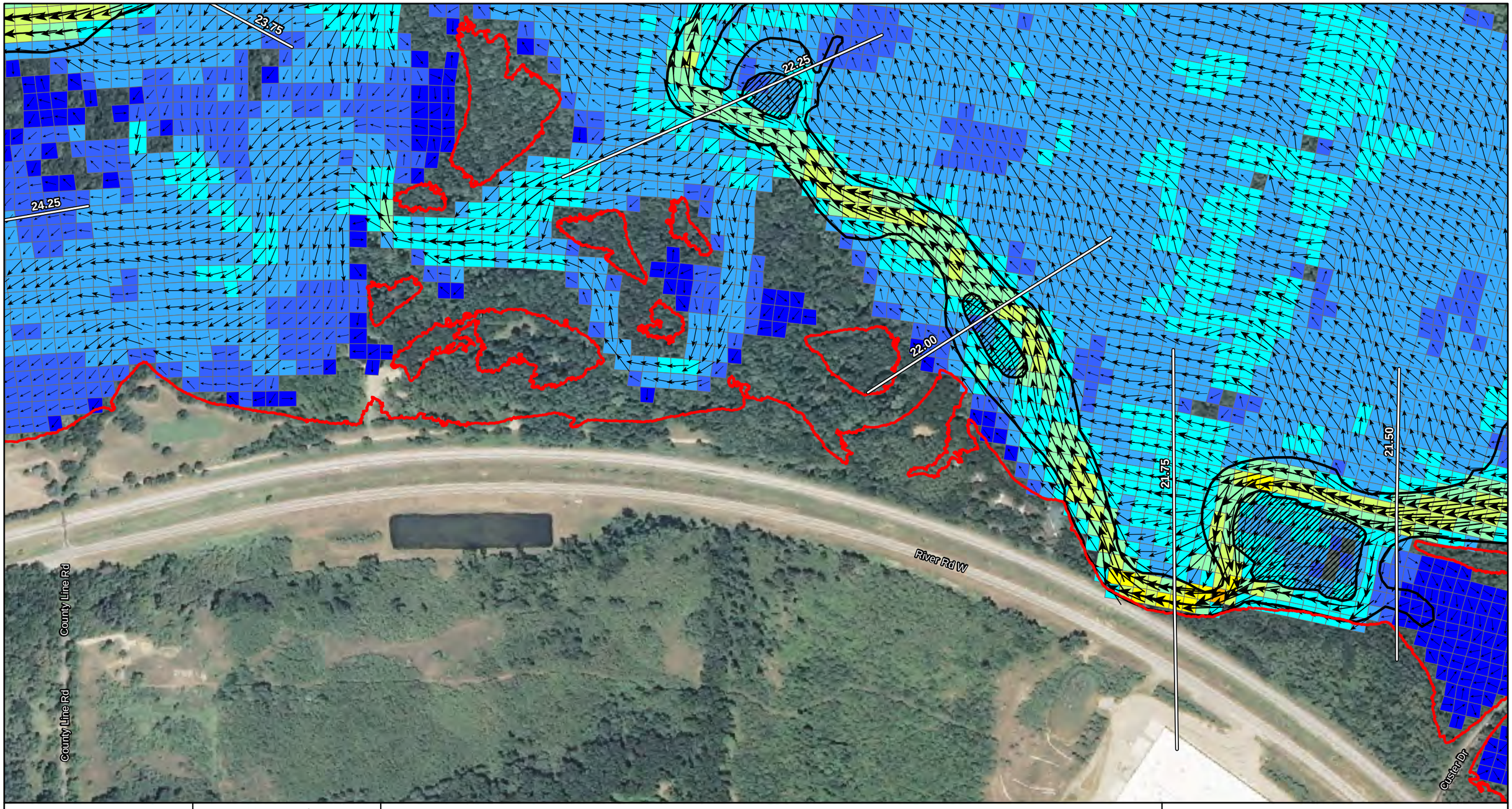
MP 21.36 - MP 21.59

SHEET 22 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May27_2011.mxd

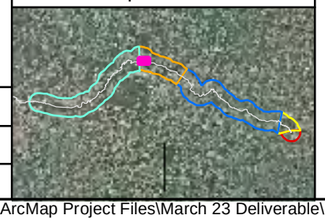
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

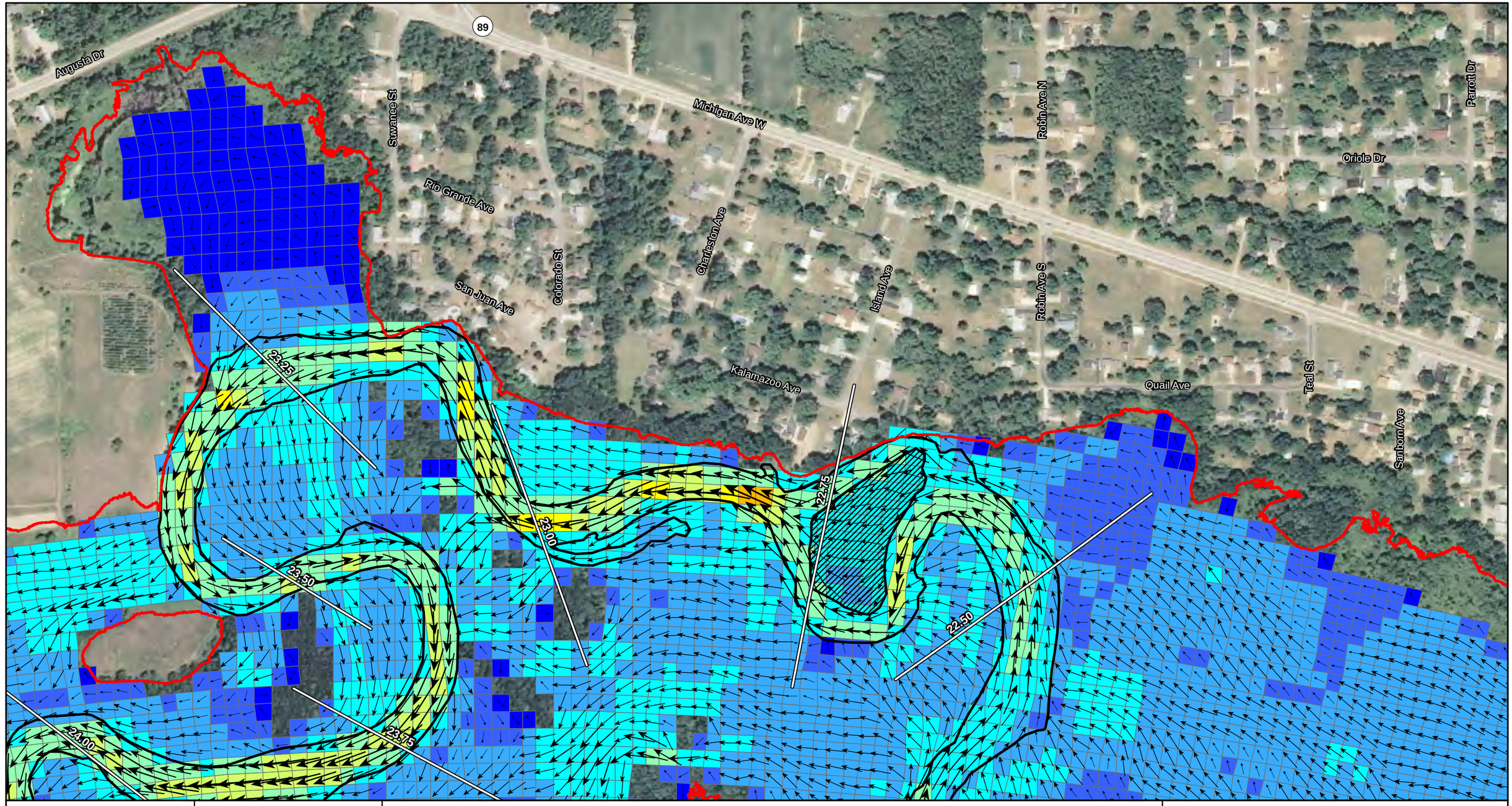
MP 21.59 - MP 22.33

SHEET 23 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May27_2011.mxd

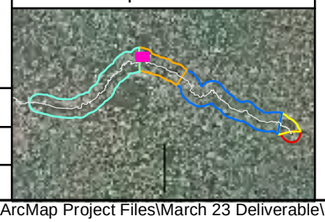
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

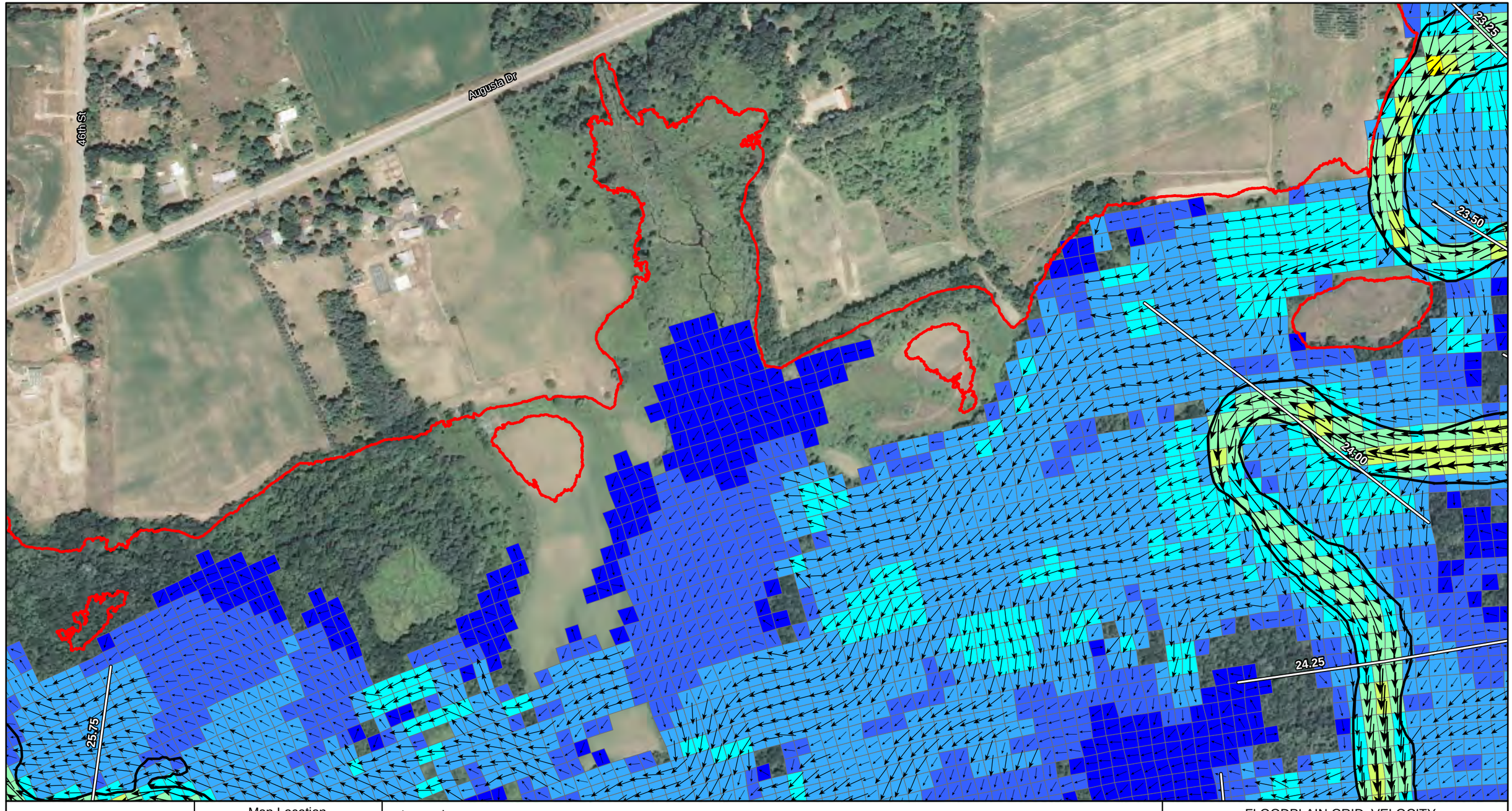
MP 22.33 - MP 24.01

SHEET 24 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May27_2011.mxd

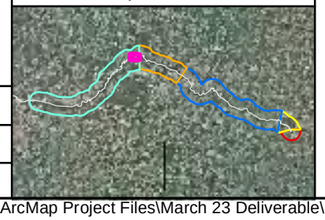
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

MP 24.01 - MP 24.33

SHEET 25 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May27_2011.mxd

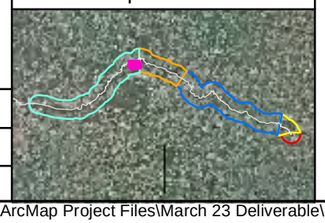
Aerial Photography Date: July & August 2009

25.75
25.50
25.25
25.00
24.75
24.50
Fort Custer Dr

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
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- Island Bankline
- HEC-RAS 100-Year Floodplain
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

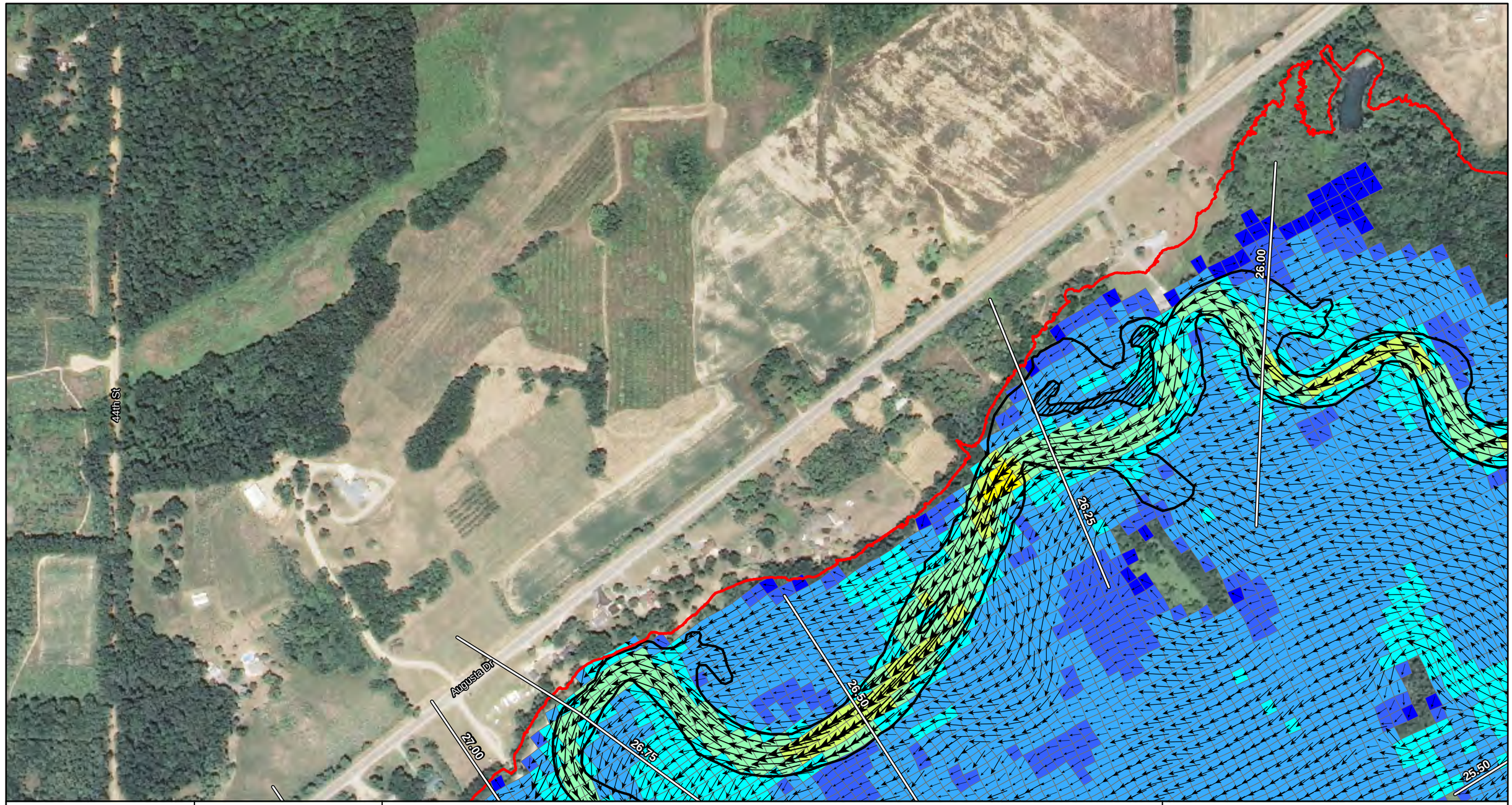
MP 24.33 - MP 25.79

SHEET 26 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May27_2011.mxd

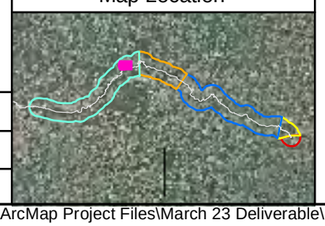
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

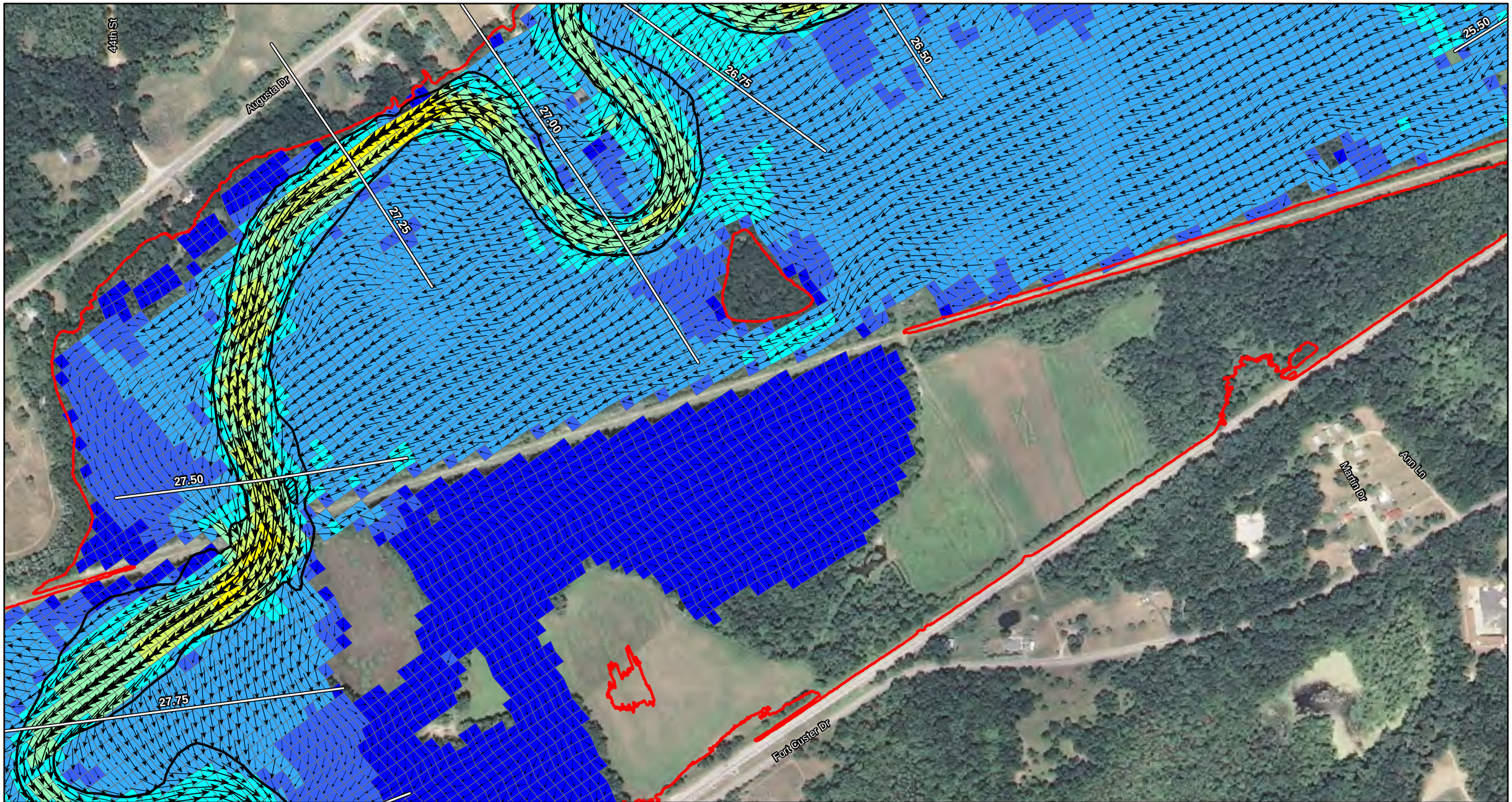
MP 25.79 - MP 26.80

SHEET 27 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

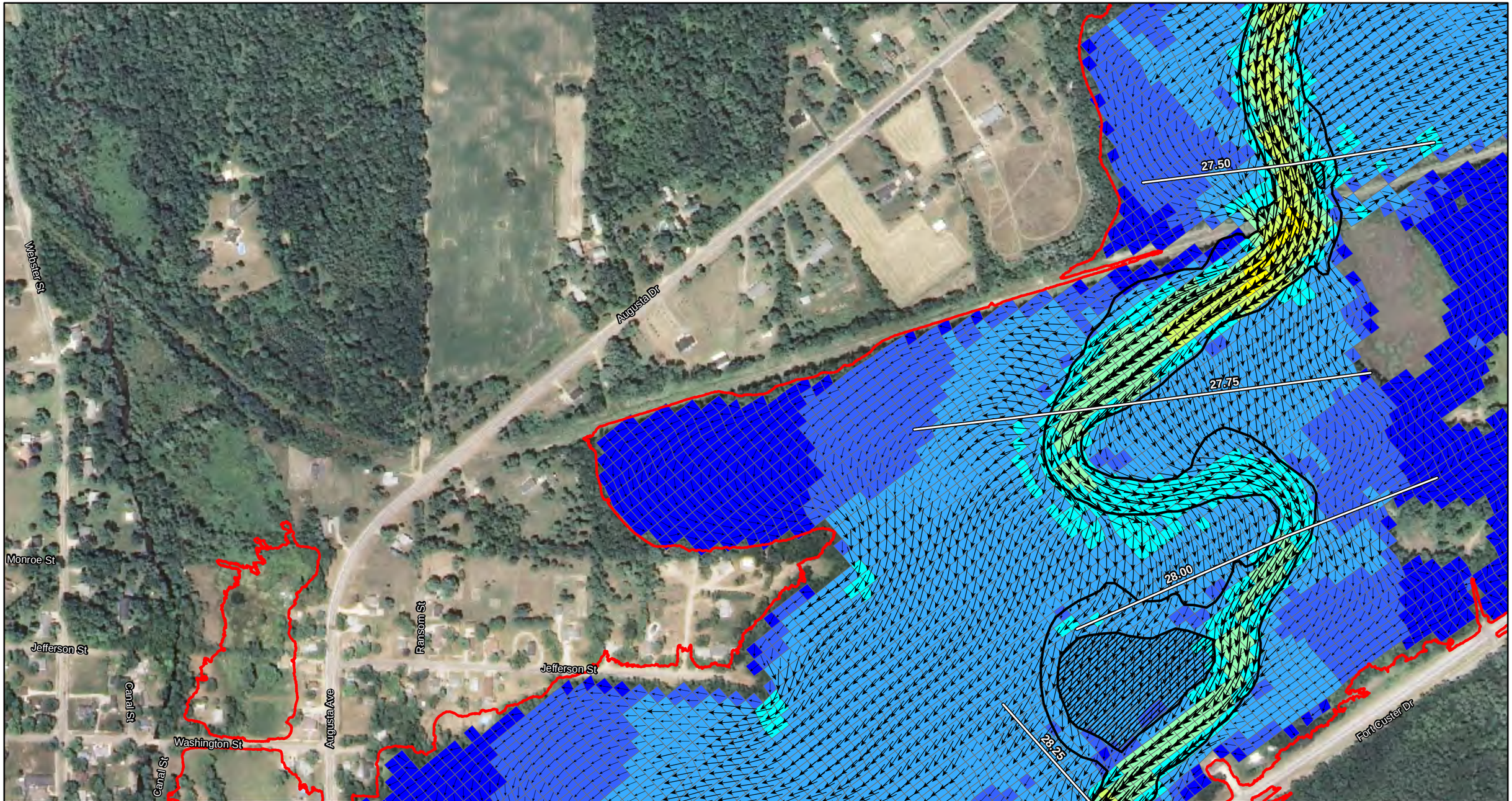
MP 26.80 - MP 27.80

SHEET 28 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May27_2011.mxd

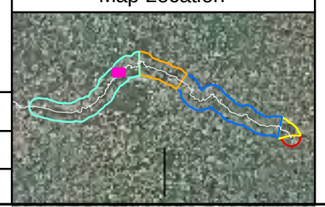
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

MP 27.80NW - MP 28.22NW

SHEET 29 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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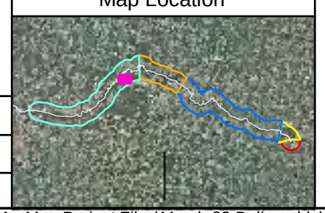
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
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- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

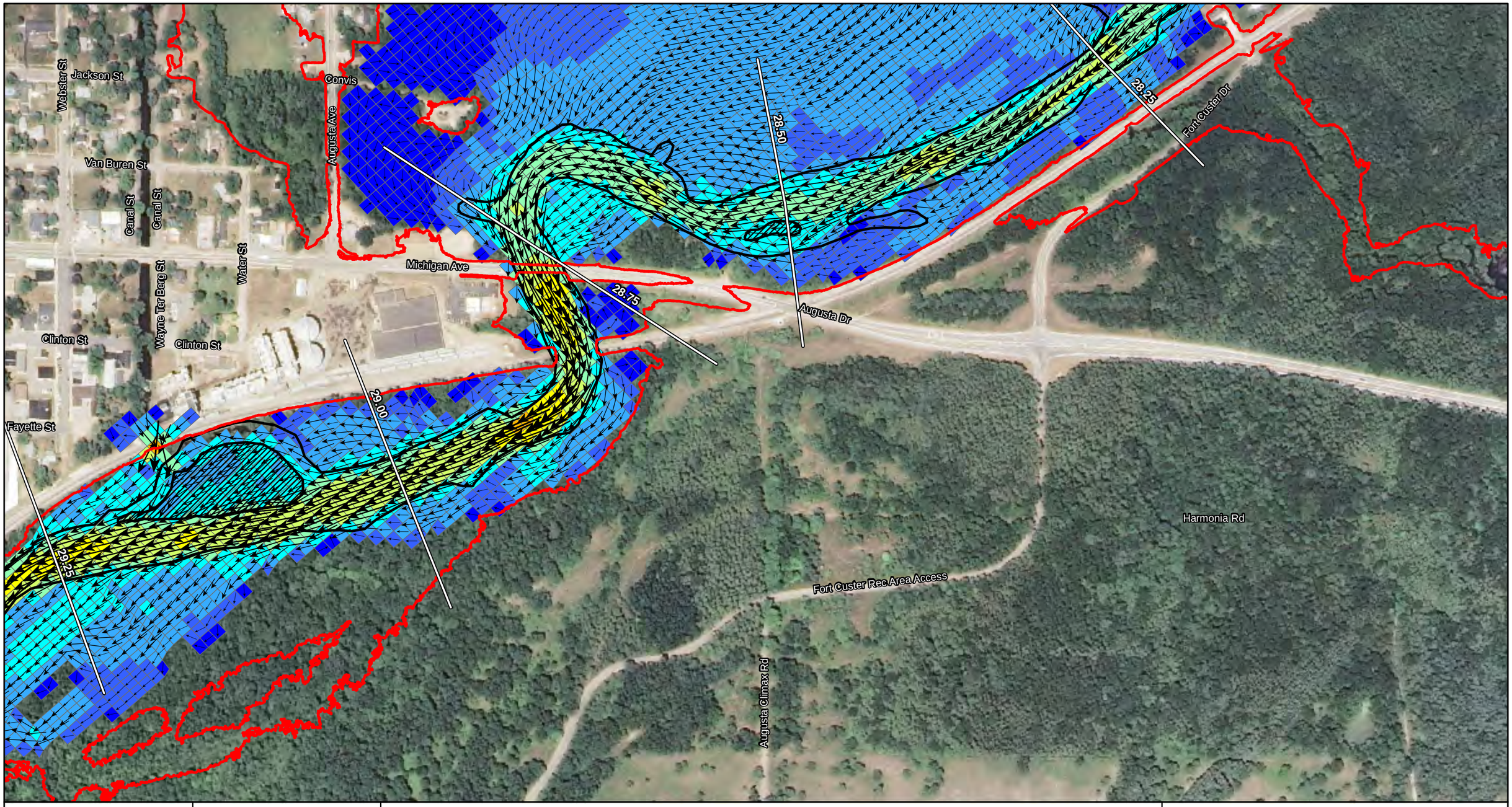
MP 27.80SE - MP 28.22SE

SHEET 30 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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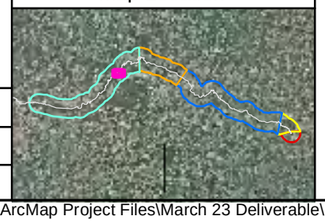
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
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- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

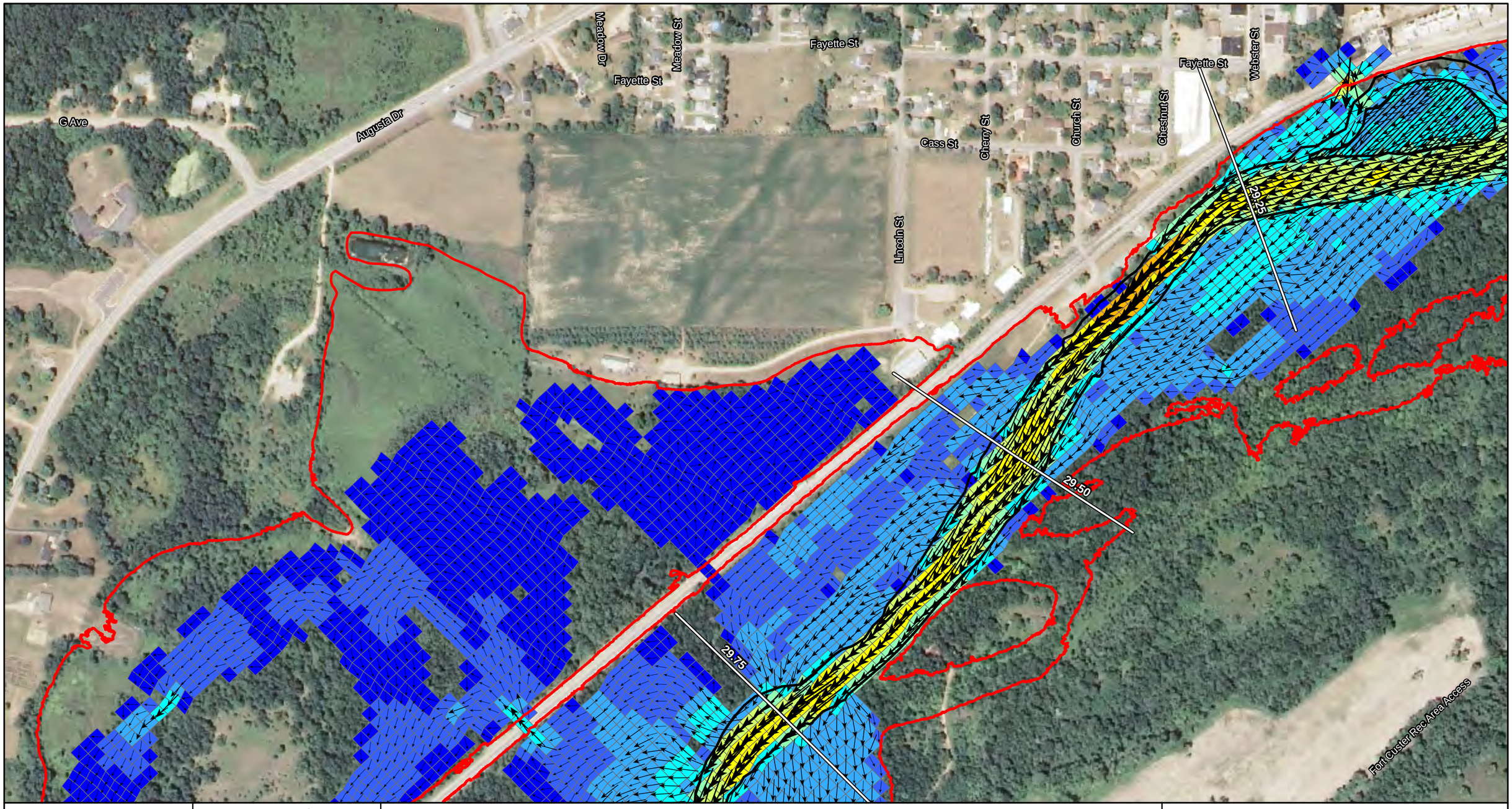
MP 27.80SE - MP 28.22SE

SHEET 31 OF 45

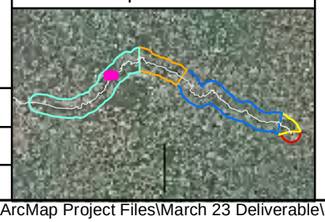
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May27_2011.mxd

Aerial Photography Date: July & August 2009



Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

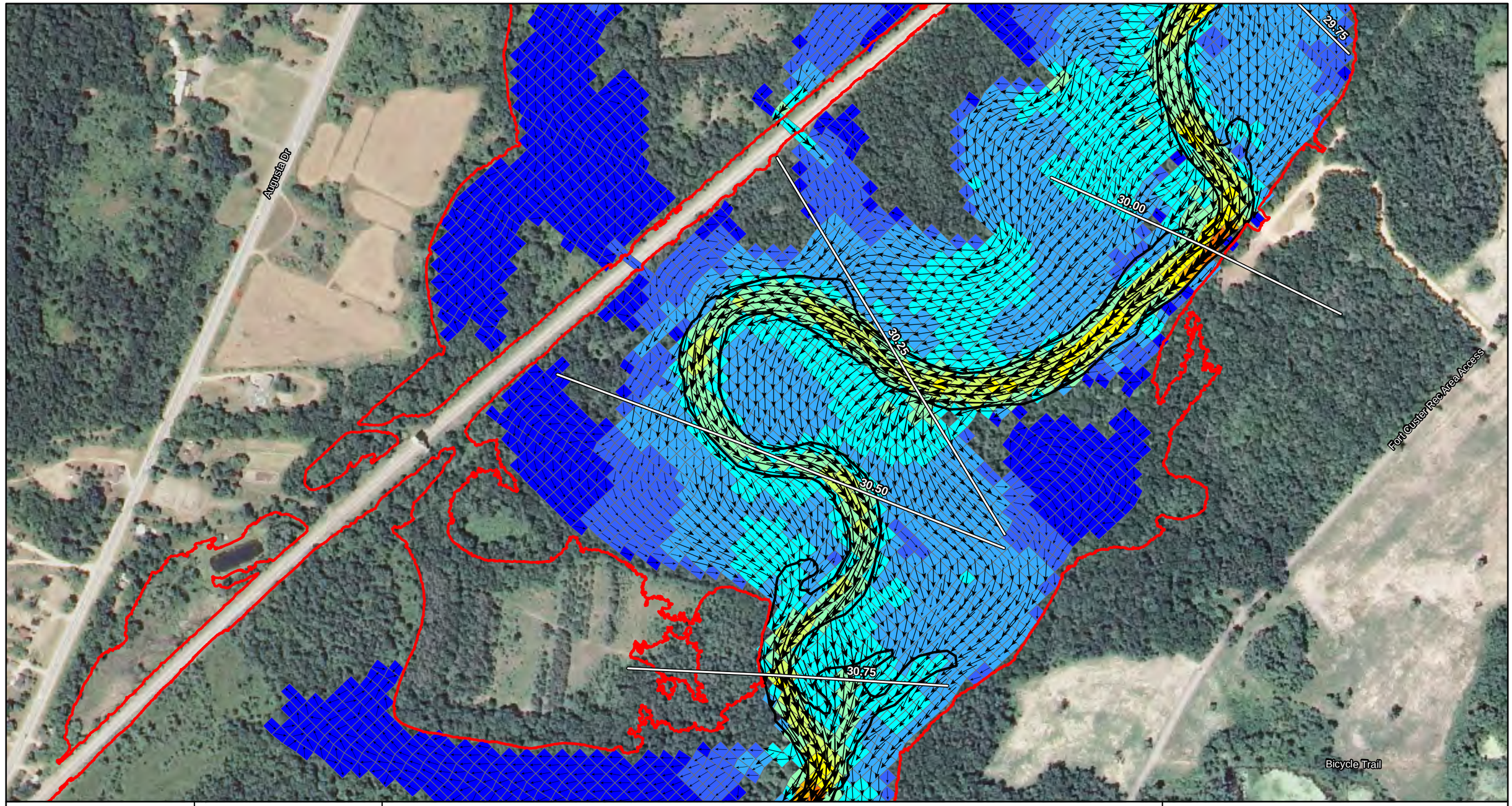
MP 27.80SE - MP 28.22SE

SHEET 32 OF 45

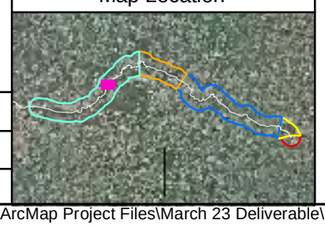
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May27_2011.mxd

Aerial Photography Date: July & August 2009



Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

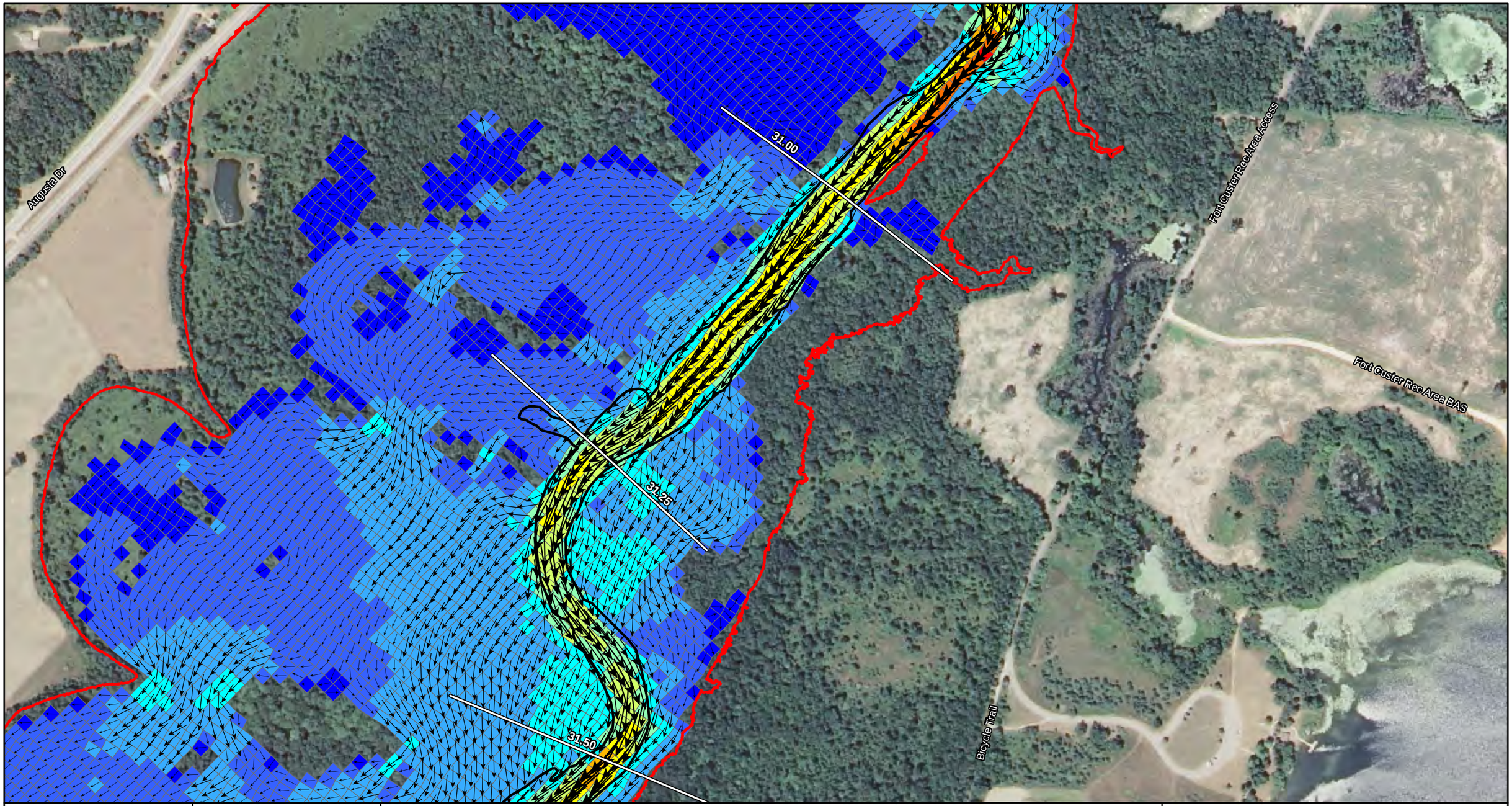
MP 29.82 - MP 30.84

SHEET 33 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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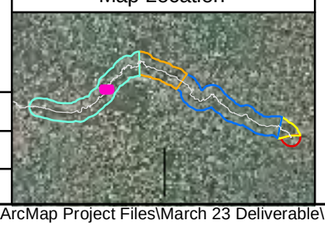
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

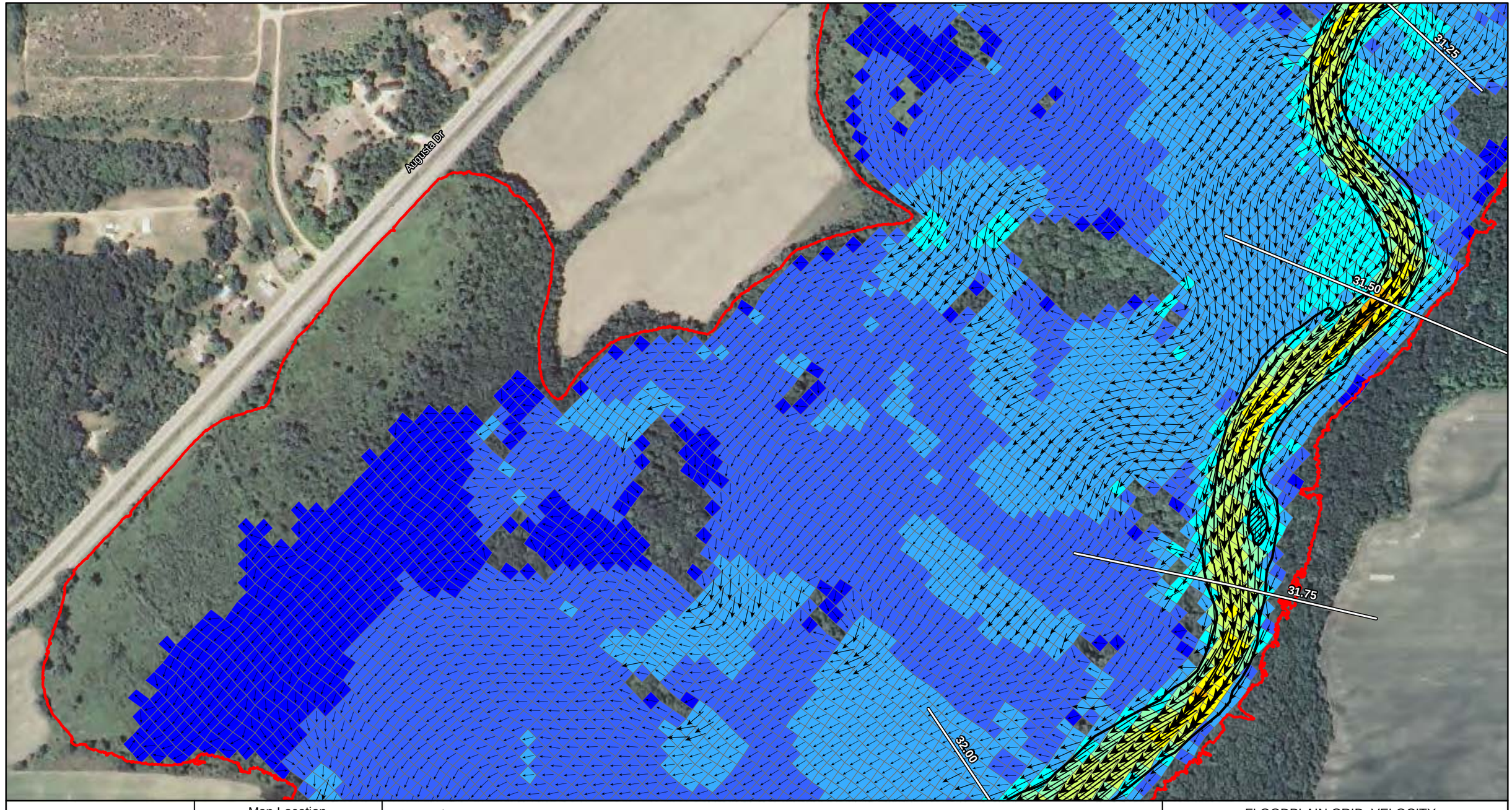
MP 30.84 - MP 31.40

SHEET 34 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

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cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

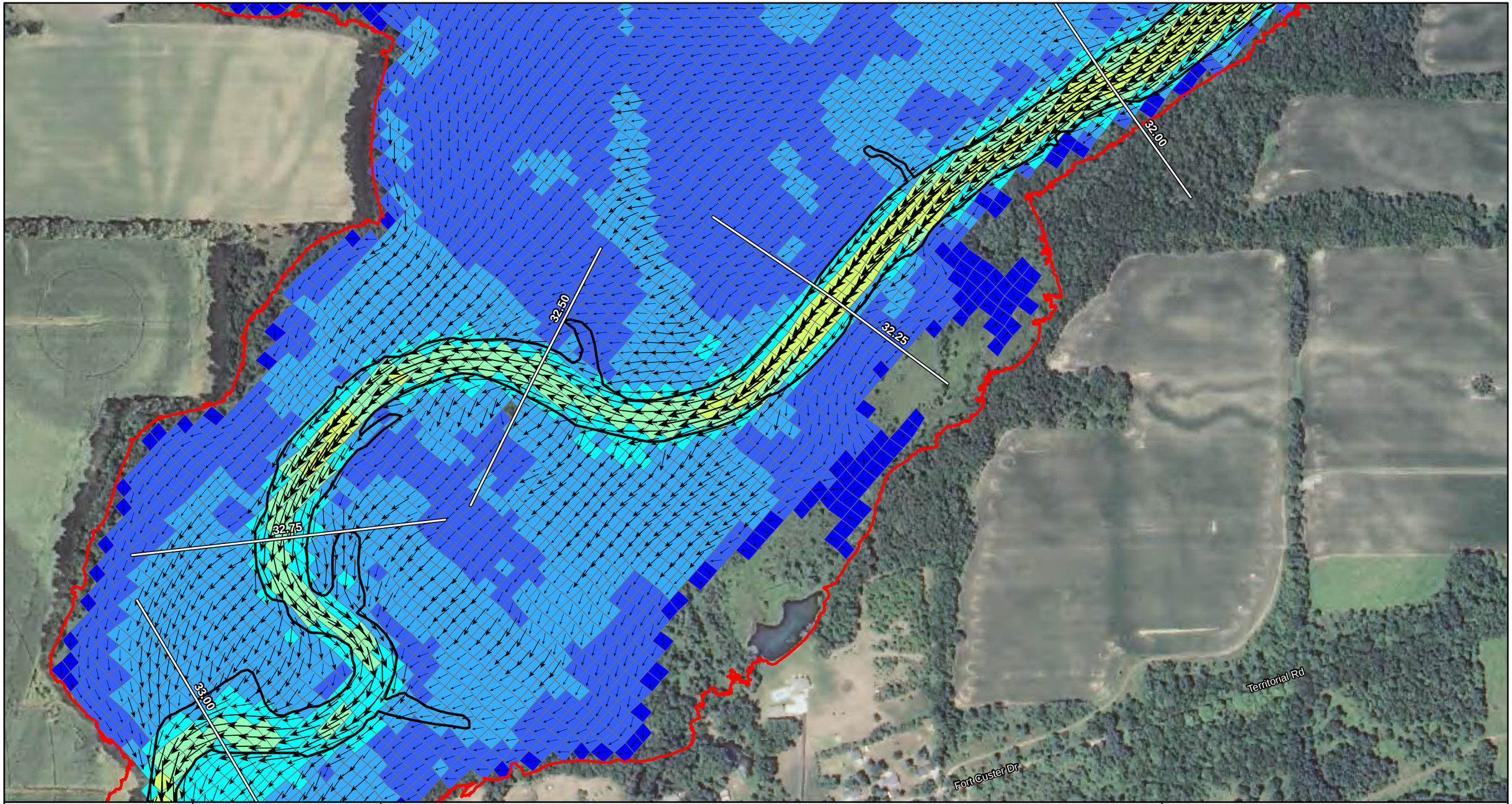
MP 31.40 - MP 31.94

SHEET 35 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

MP 31.94 - MP 33.00

SHEET 36 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May27_2011.mxd

Aerial Photography Date: July & August 2009

Augusta Dr

32.75

33.00

33.25

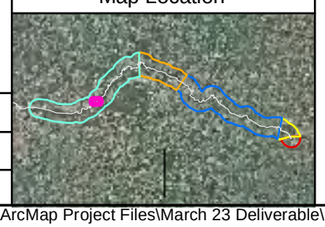
33.50

Fort Custer Dr

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
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ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

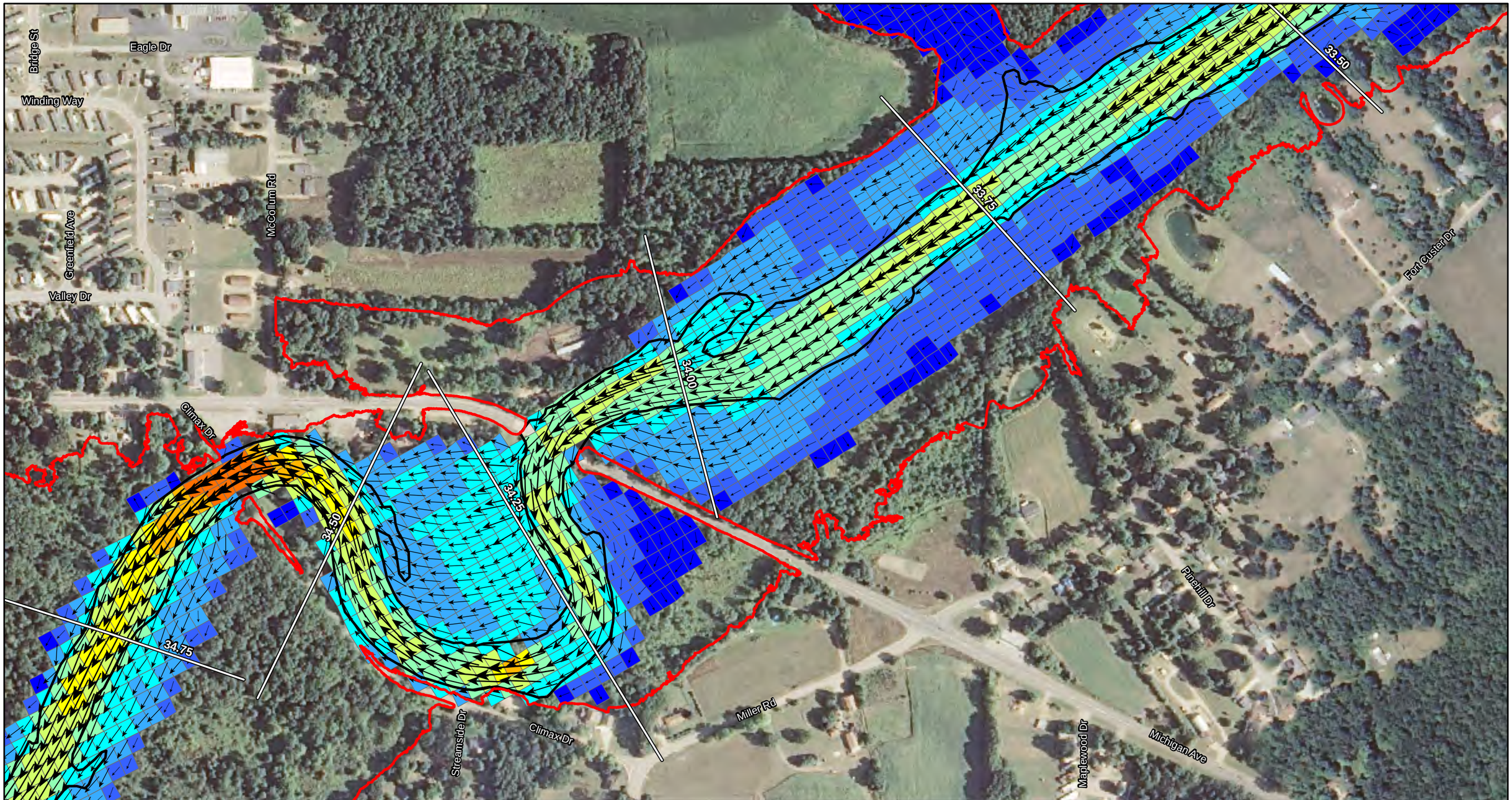
MP 31.94 - MP 33.00

SHEET 37 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May27_2011.mxd

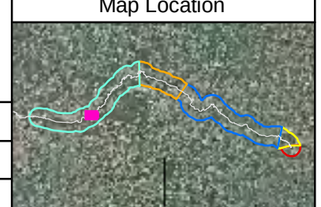
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
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- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

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- Island Bankline
- HEC-RAS 100-Year Floodplain
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

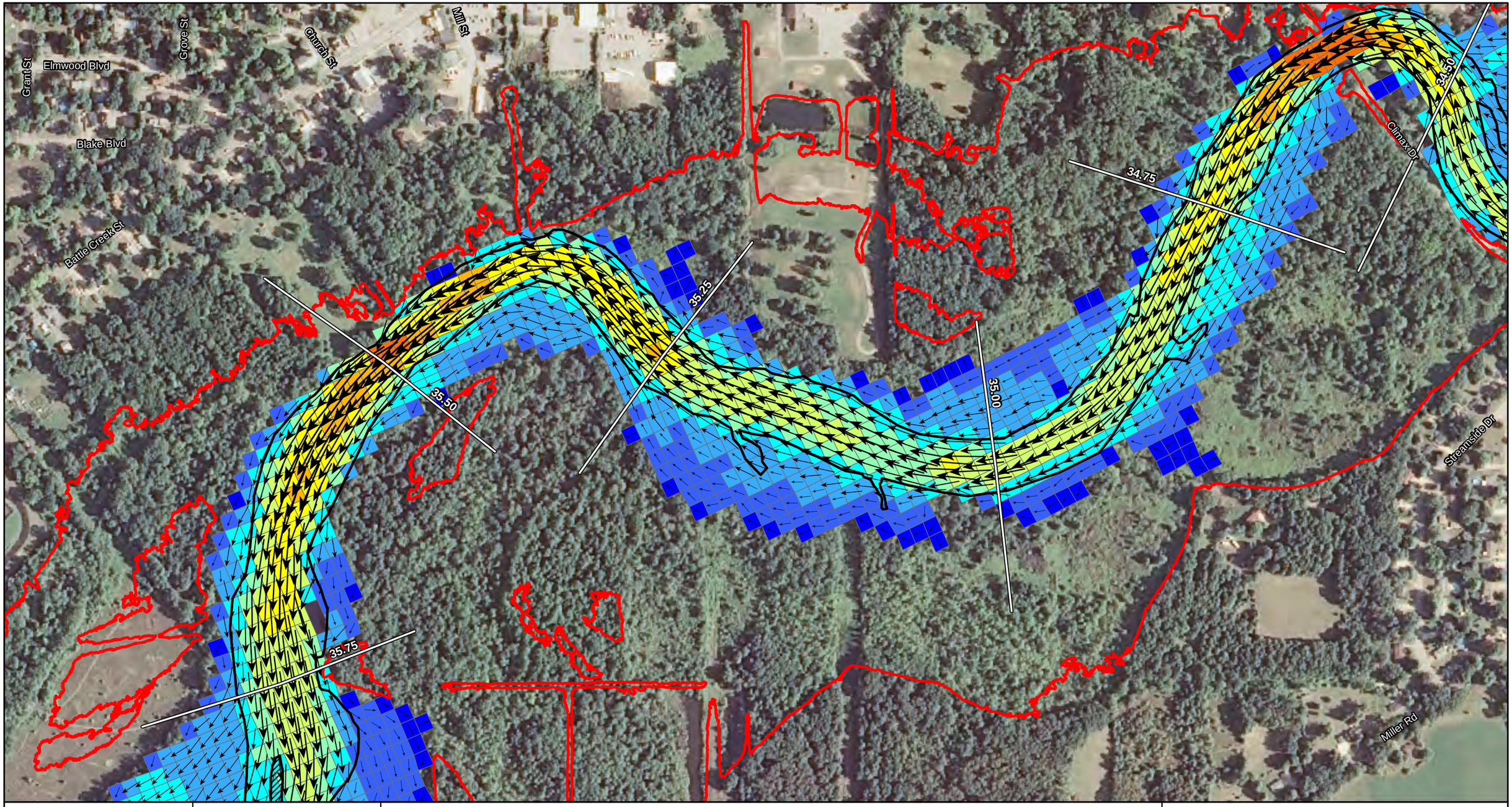
MP 33.52 - MP 34.70

SHEET 38 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May27_2011.mxd

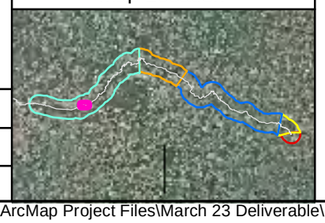
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
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- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
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- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

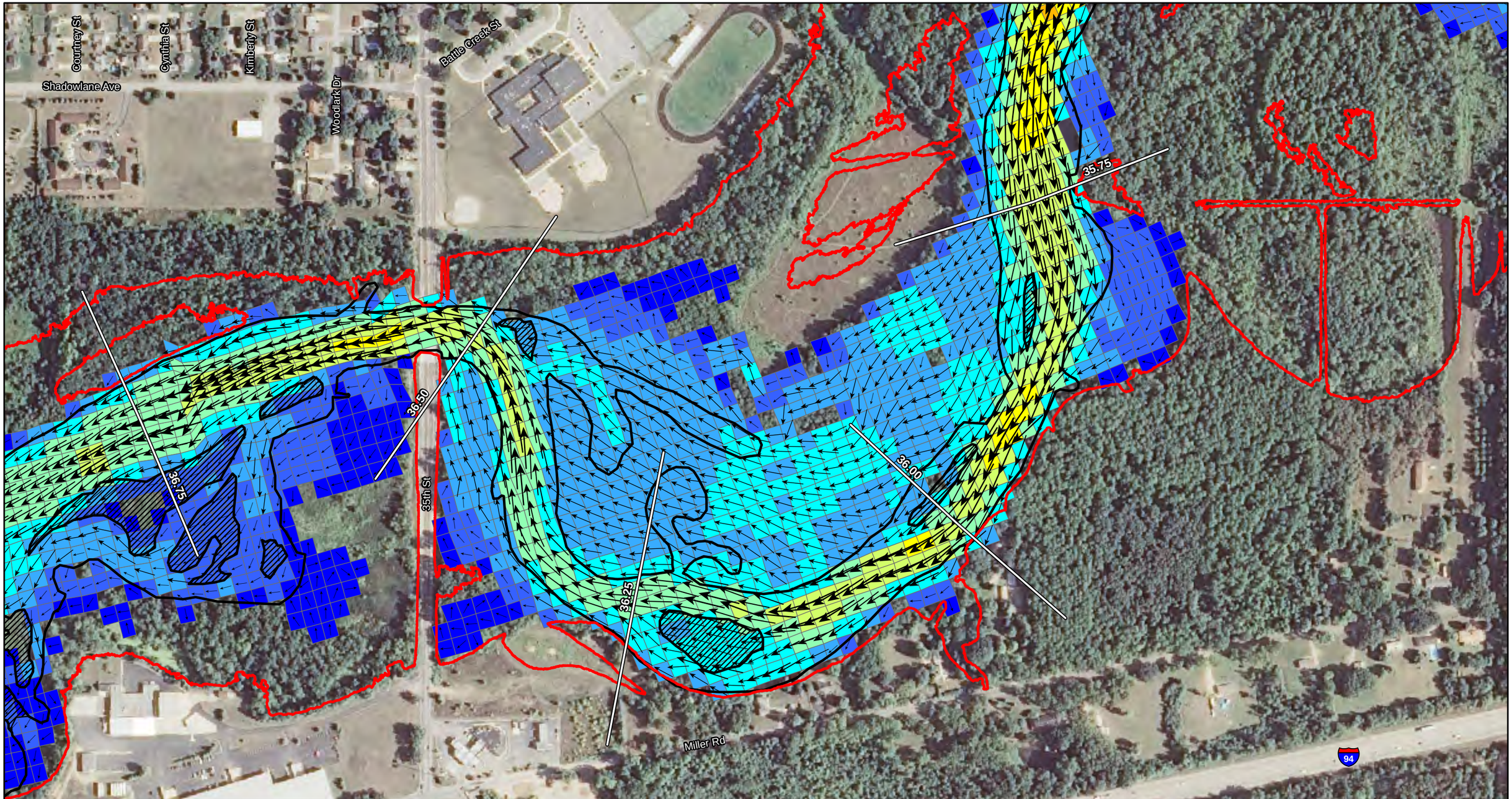
MP 34.70 - MP 35.75

SHEET 39 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
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- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

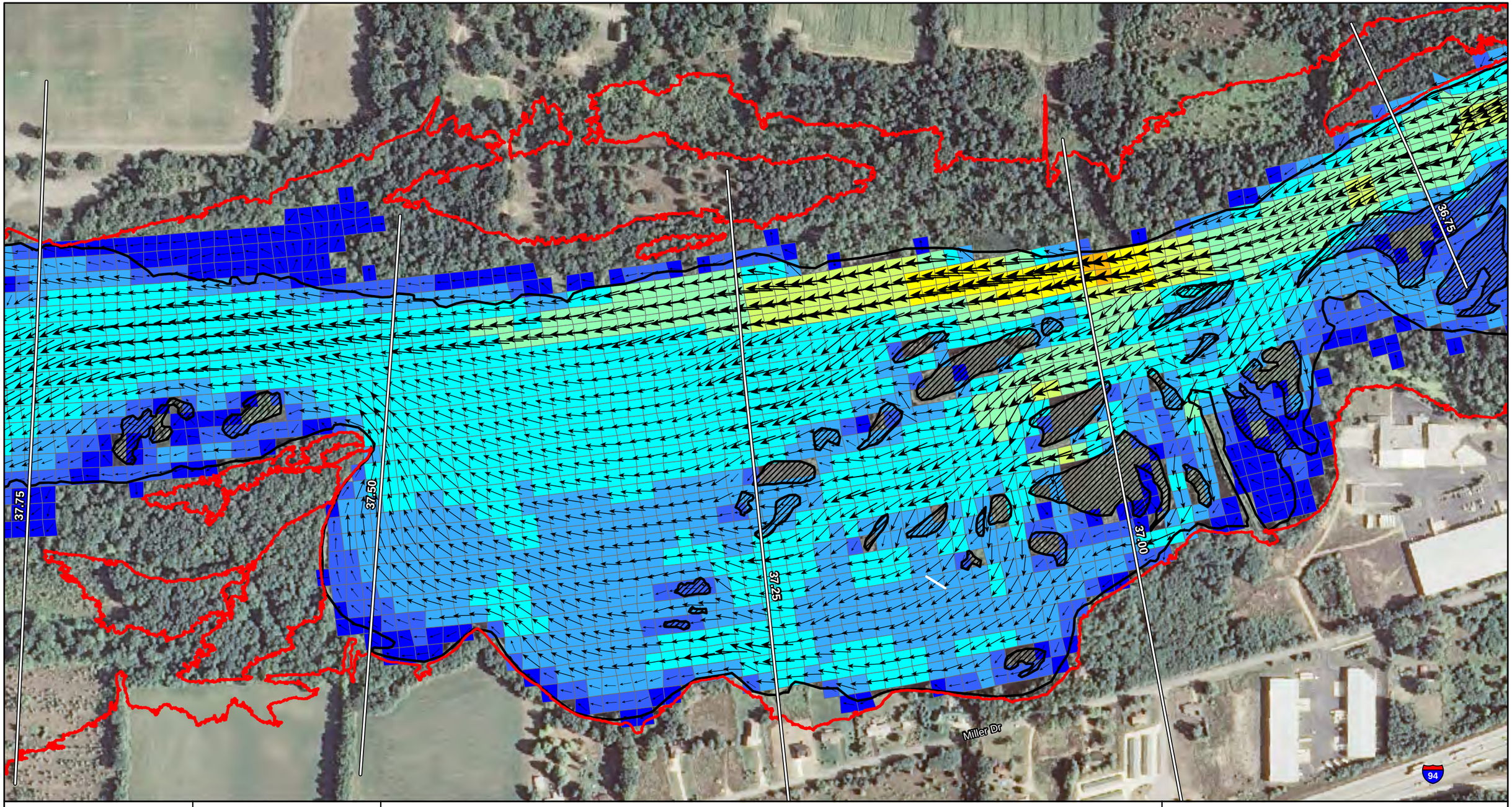
MP 35.75 - MP 36.75

SHEET 40 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

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- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

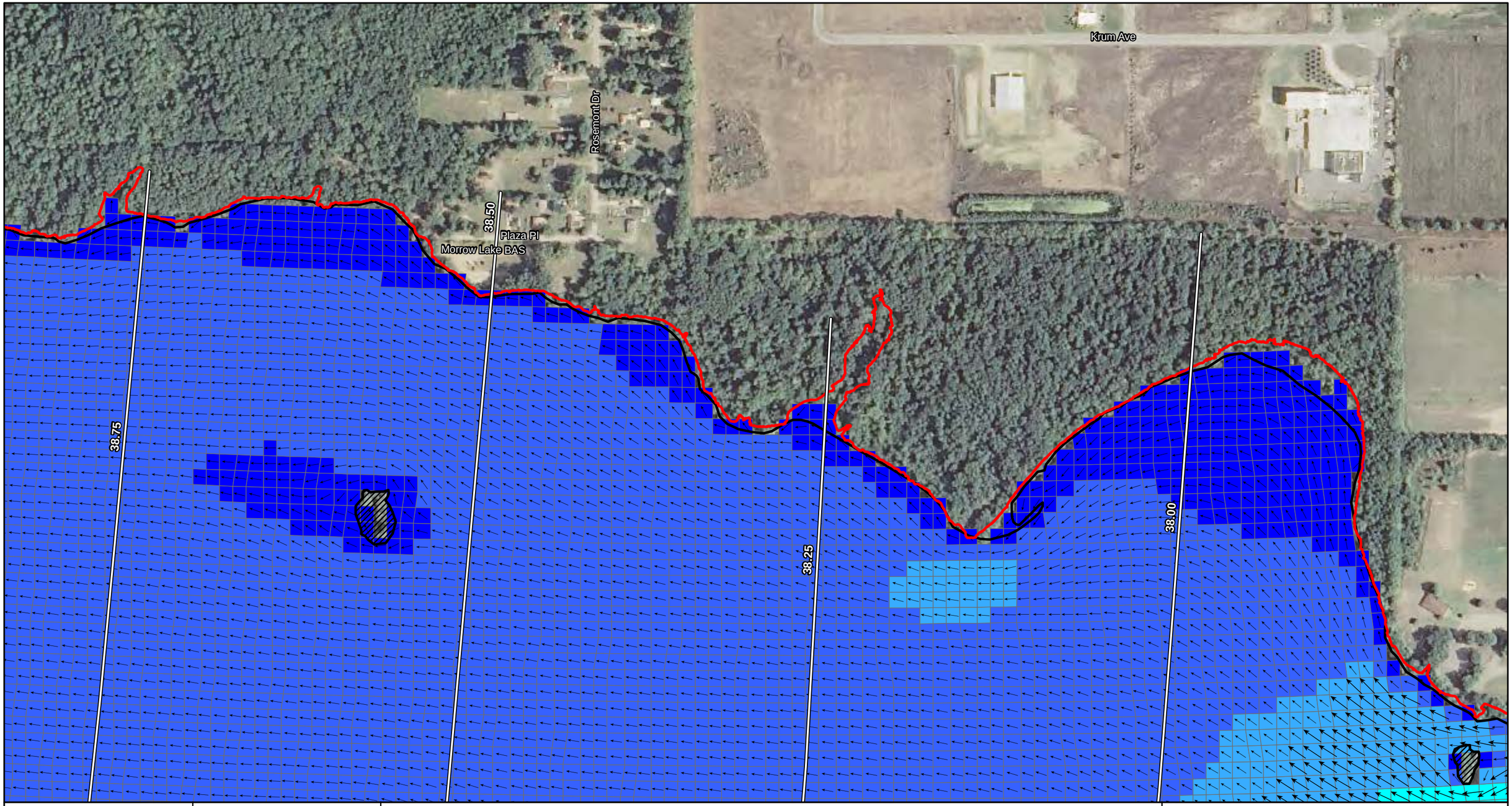
MP 36.75 - MP 37.75

SHEET 41 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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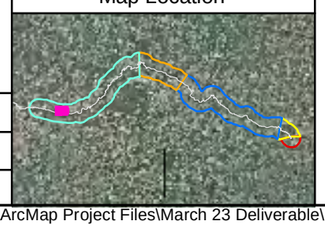
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

MP 37.75N - MP 38.80N

SHEET 42 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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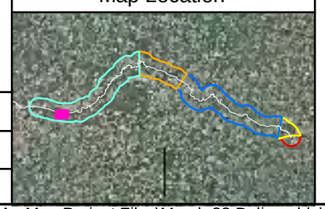
Aerial Photography Date: July & August 2009

38.75
38.50
38.25
38.00
37.75
94
Lyth Rd
Miller Dr

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

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- Channel Bankline
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

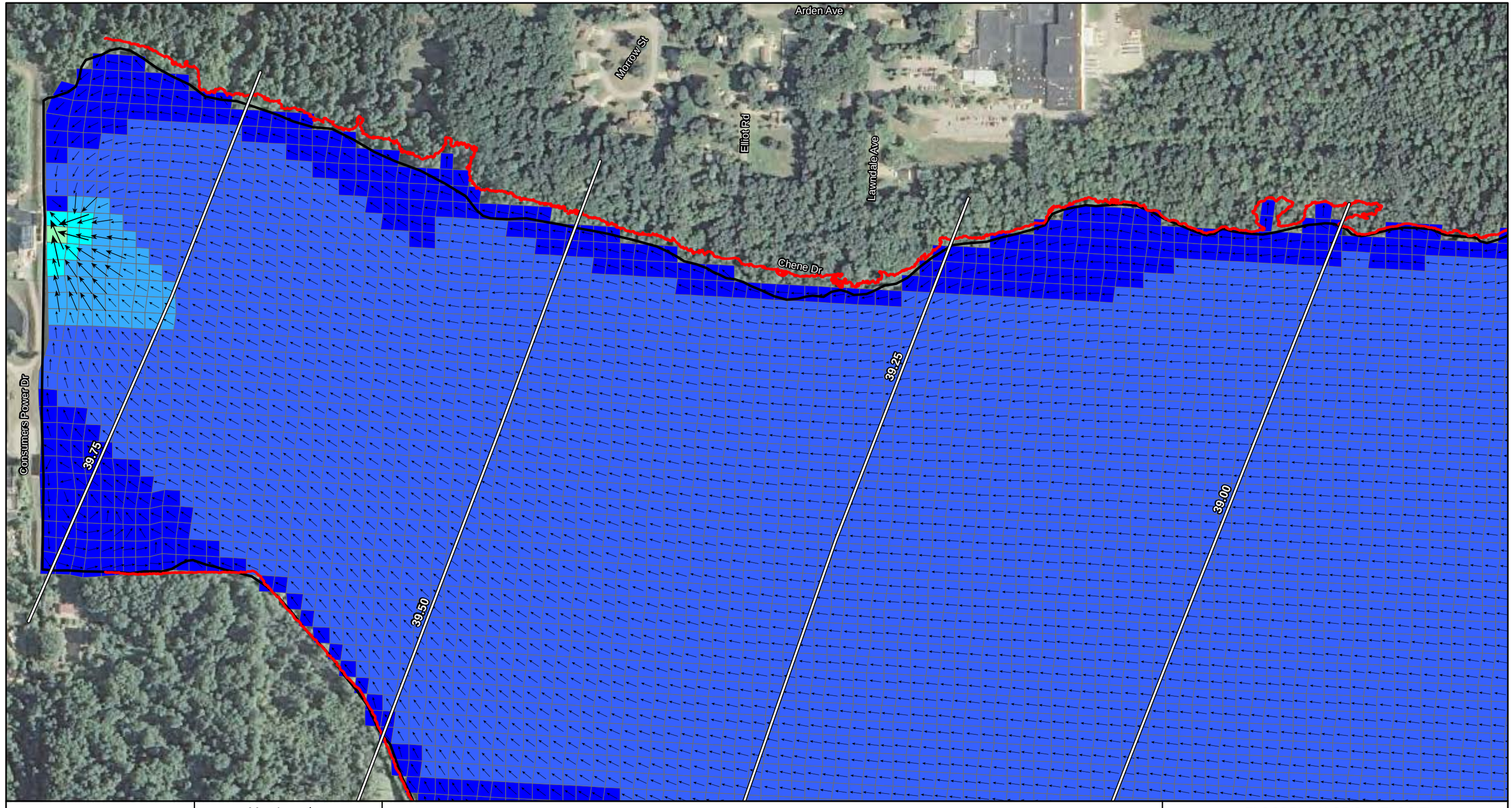
MP 37.75N - MP 38.80N

SHEET 43 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May27_2011.mxd

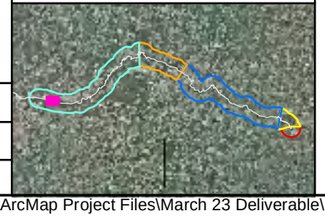
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

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- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

MP 38.80N - MP 39.95N

SHEET 44 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May27_2011.mxd

Aerial Photography Date: July & August 2009

39.50

39.25

39.00

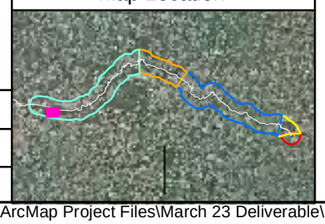
38.75

94

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
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- 0.5 - 1.0 ft/sec
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- 1.5 - 2.0 ft/sec
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N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 27, 2011

MP 38.80S - MP 39.95S

SHEET 45 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May27_2011.mxd

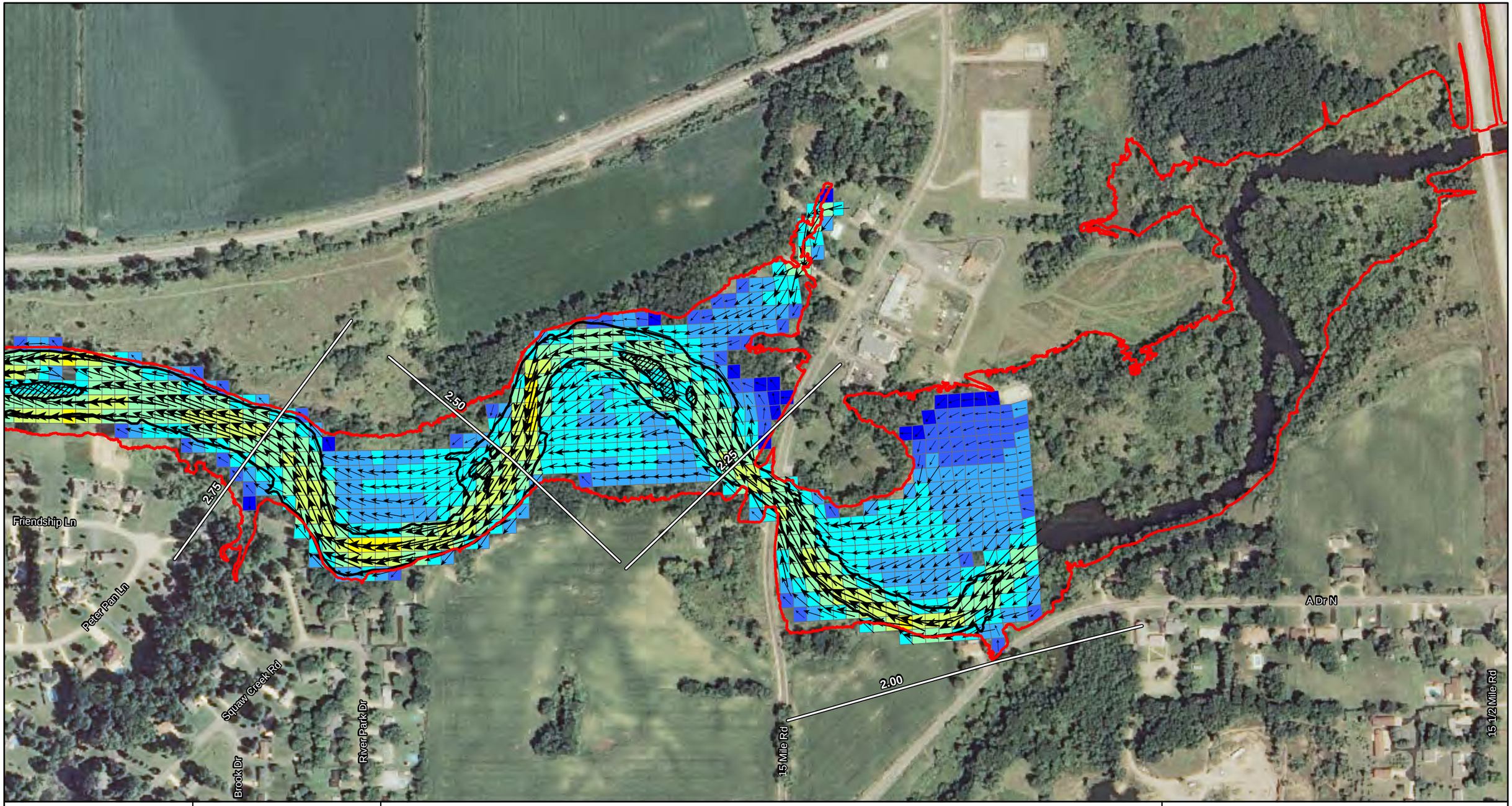
Aerial Photography Date: July & August 2009

Figure 5-16

Floodplain Grid: Velocity

May 28, 2011

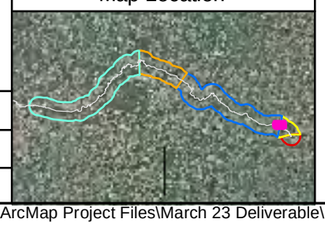
Sheets 1 through 45



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
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- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

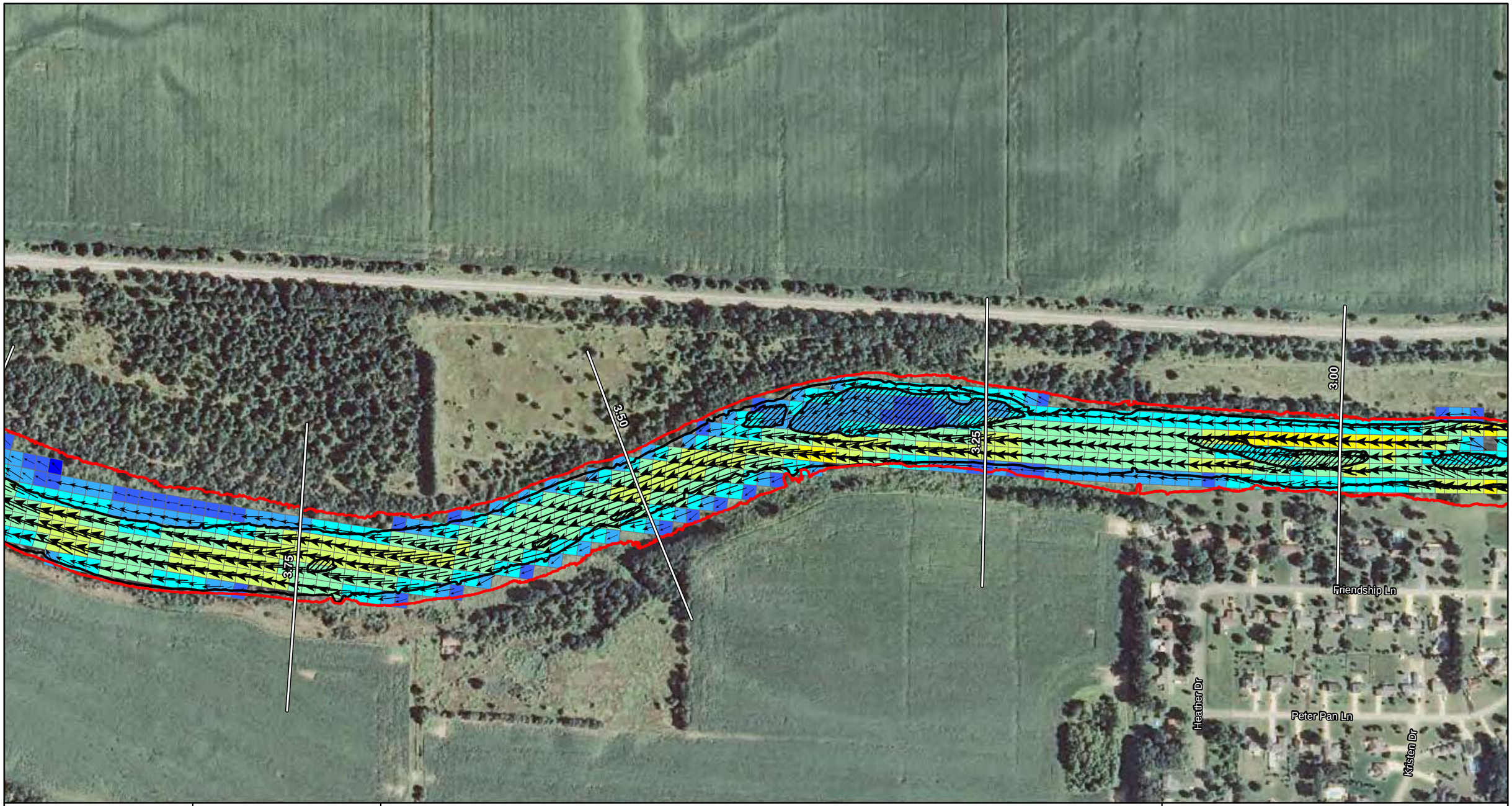
MP 01.88 - MP 02.91

SHEET 1 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May28_2011.mxd

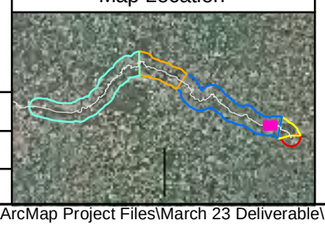
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

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- < 0.1 ft/sec
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

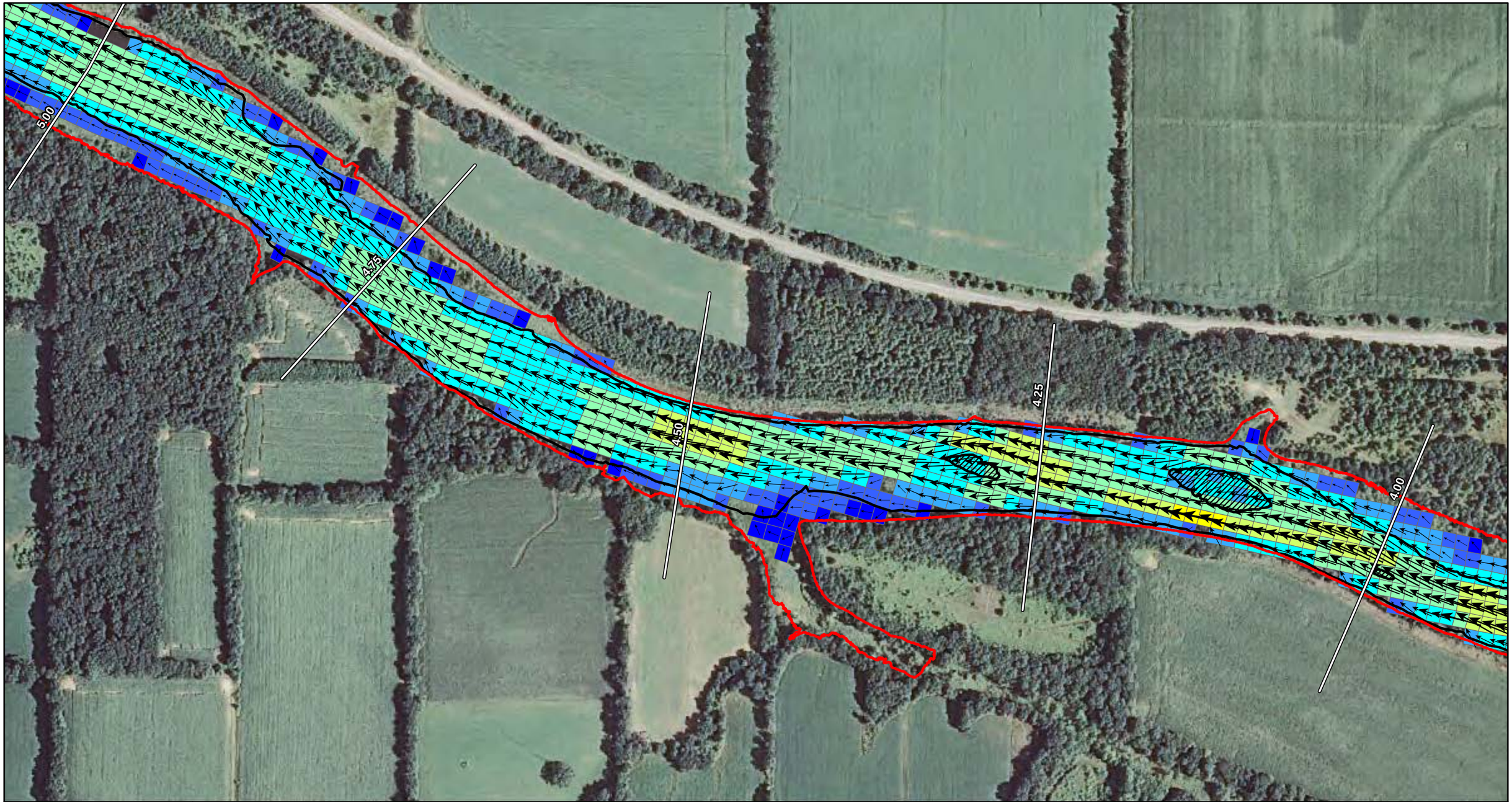
MP 02.91 - MP 03.93

SHEET 2 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
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- 1.0 - 1.5 ft/sec
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- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

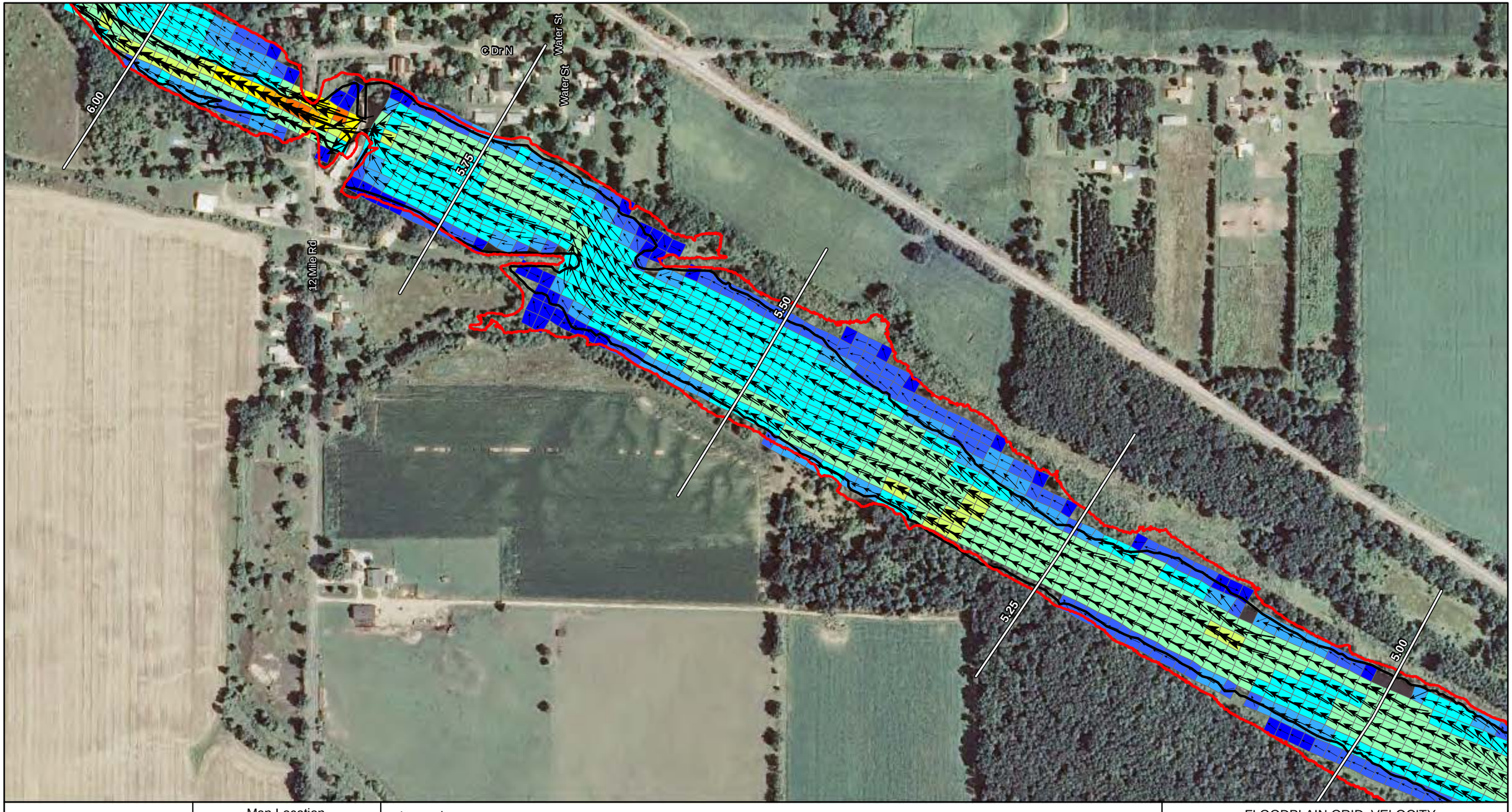
MP 03.93 - MP 04.98

SHEET 3 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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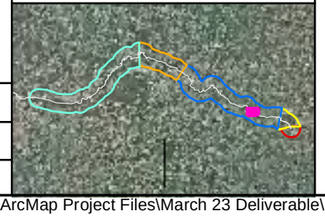
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

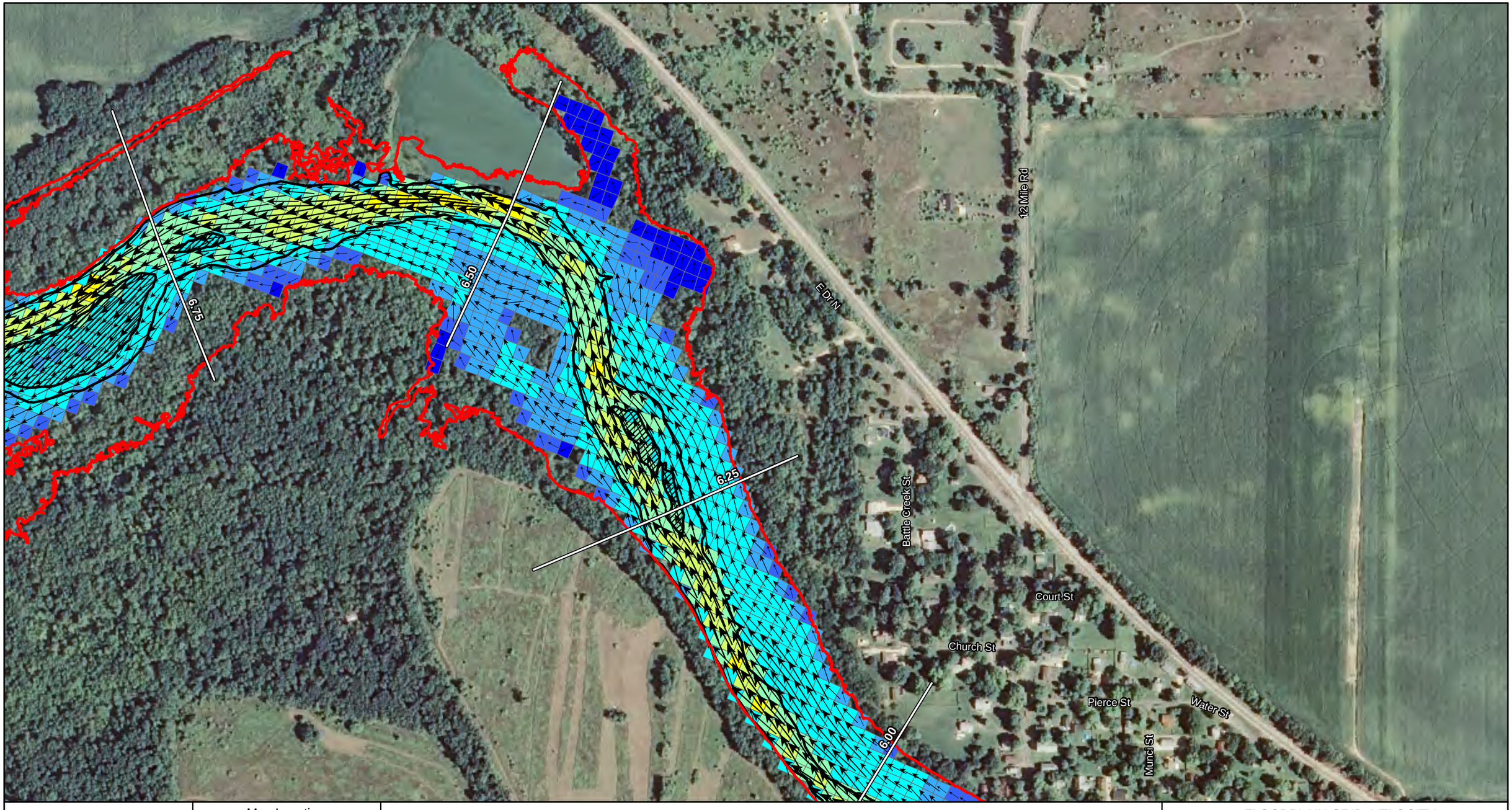
MP 04.98 - MP 06.03

SHEET 4 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May28_2011.mxd

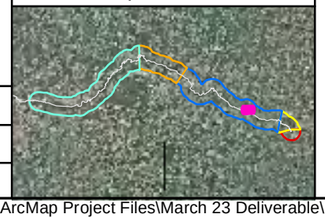
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
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- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

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ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

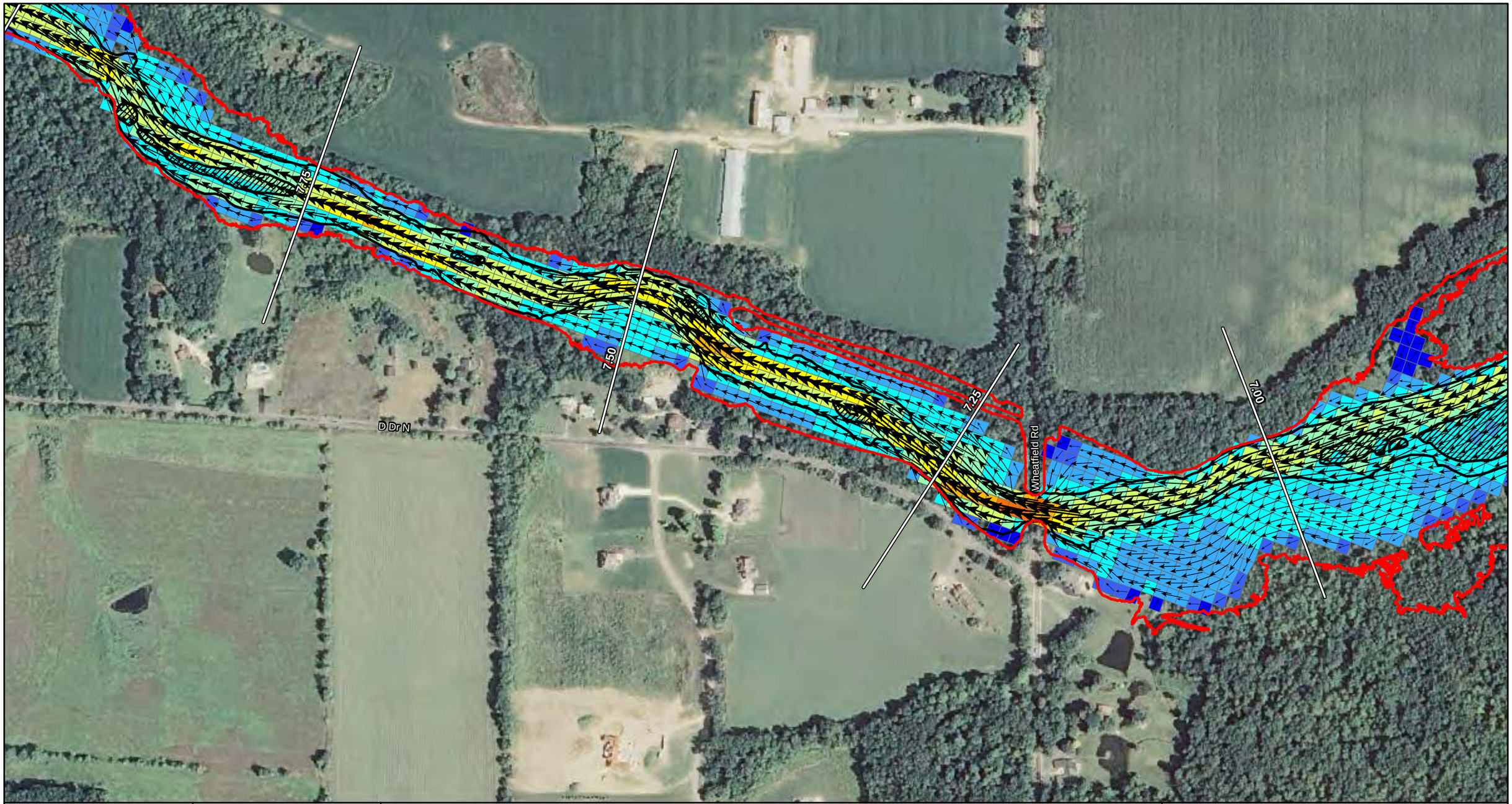
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SHEET 5 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May28_2011.mxd

Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
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N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

MP 06.85 - MP 07.95

SHEET 6 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May28_2011.mxd

Aerial Photography Date: July & August 2009

9.00

8.75

8.50

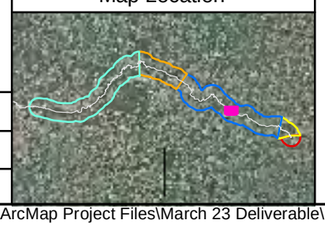
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8.00

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
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N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

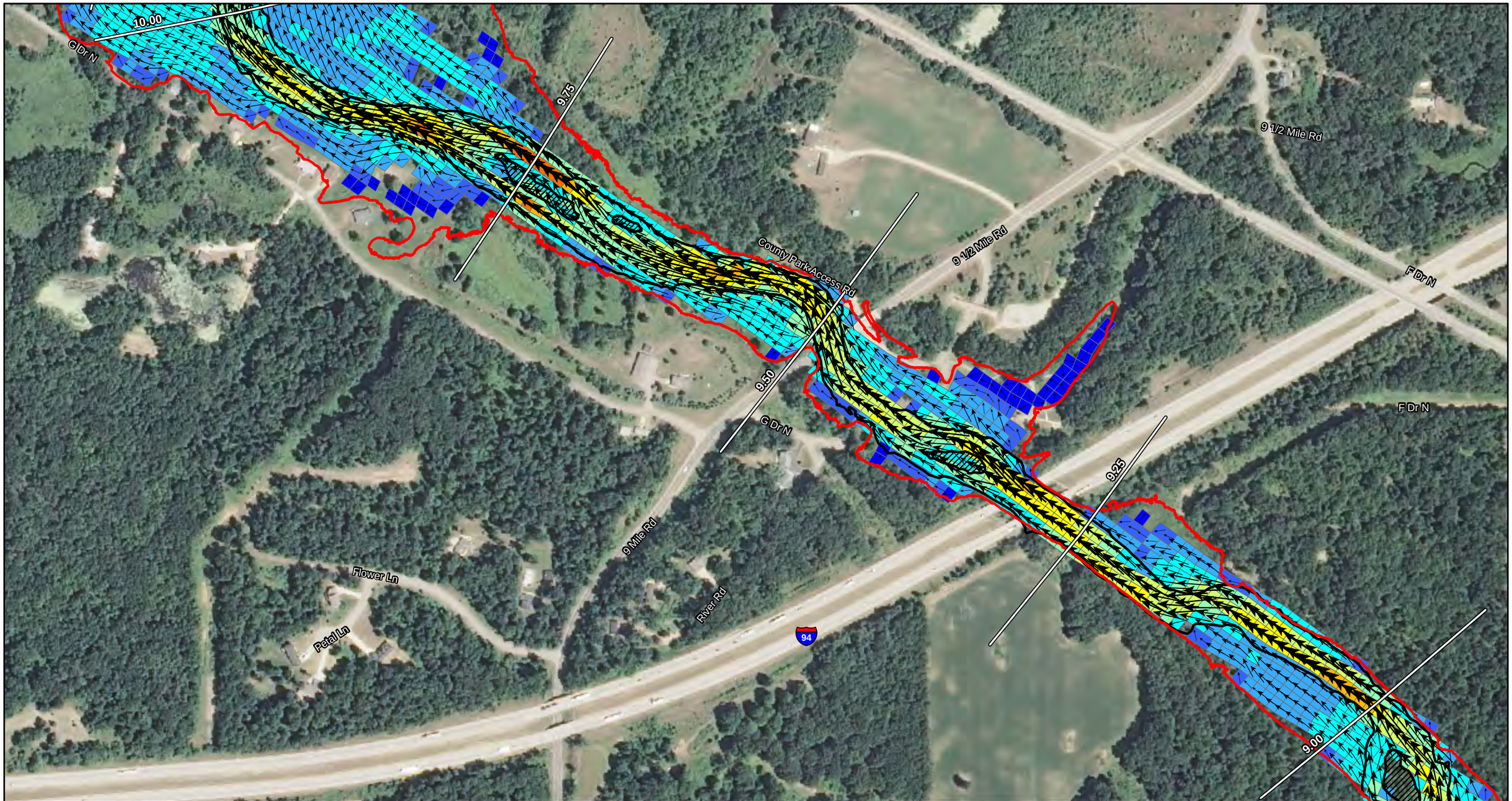
MP 07.95 - MP 08.93

SHEET 7 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
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- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
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ft/sec = Feet Per Second
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0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

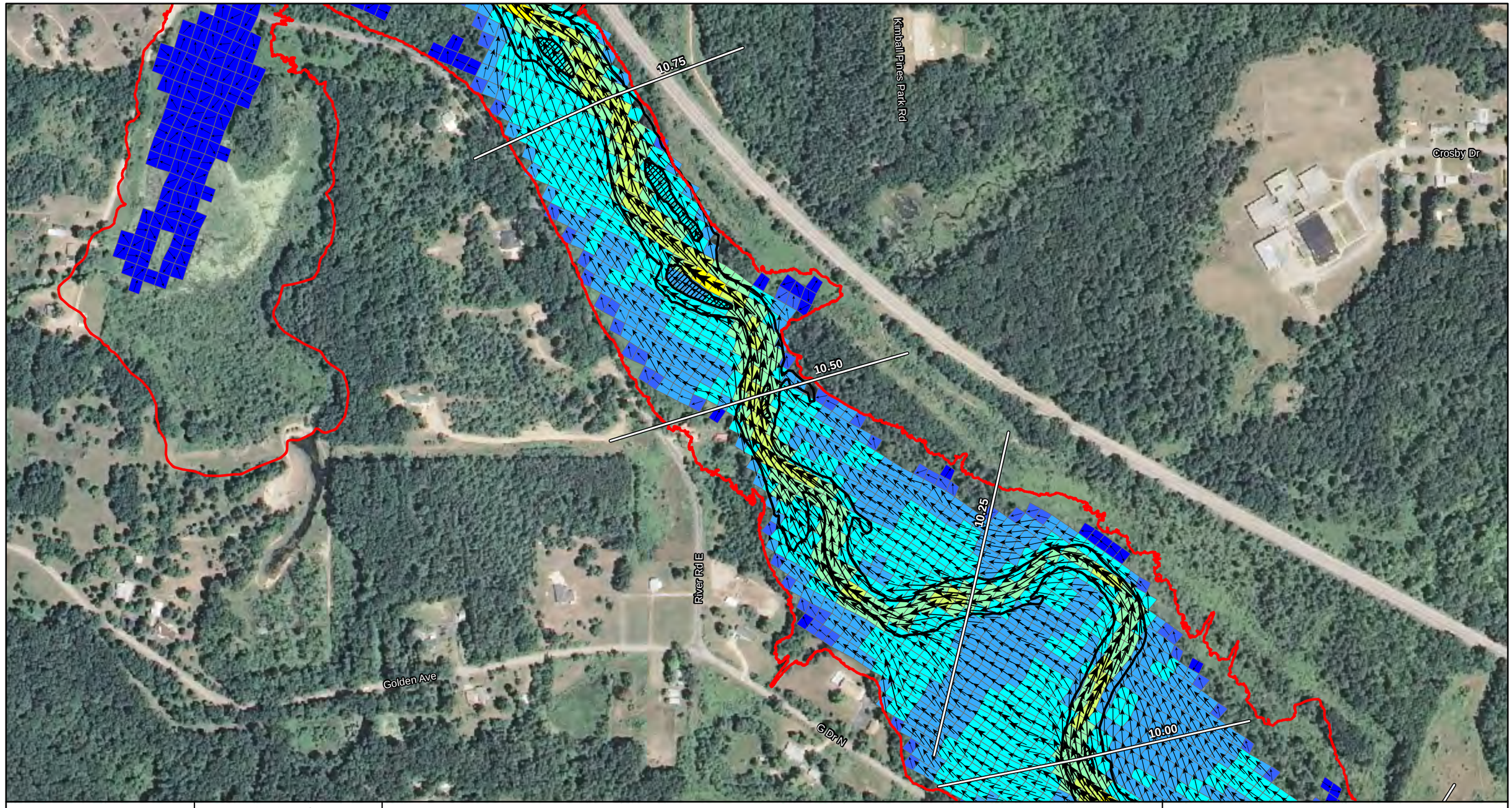
MP 08.93 - MP 10.00

SHEET 8 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May28_2011.mxd

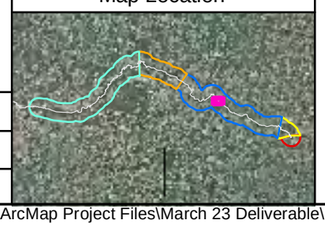
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

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Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

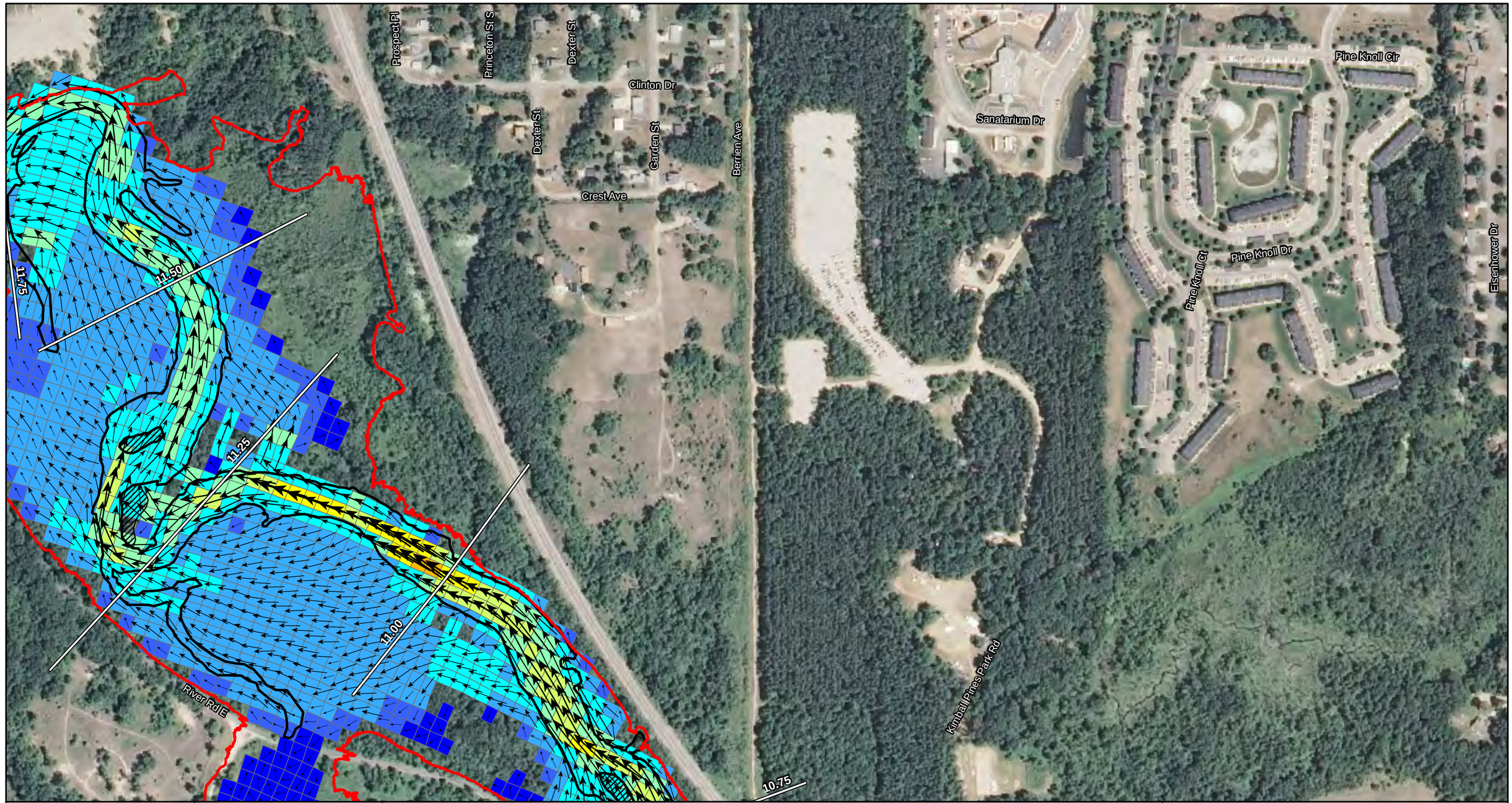
MP 10.00 - MP 10.80

SHEET 9 OF 45

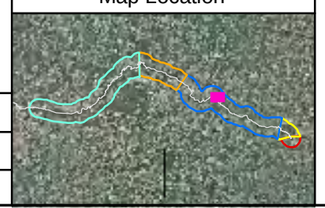
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May28_2011.mxd

Aerial Photography Date: July & August 2009



Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

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0 175 350 700
Scale in Feet

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

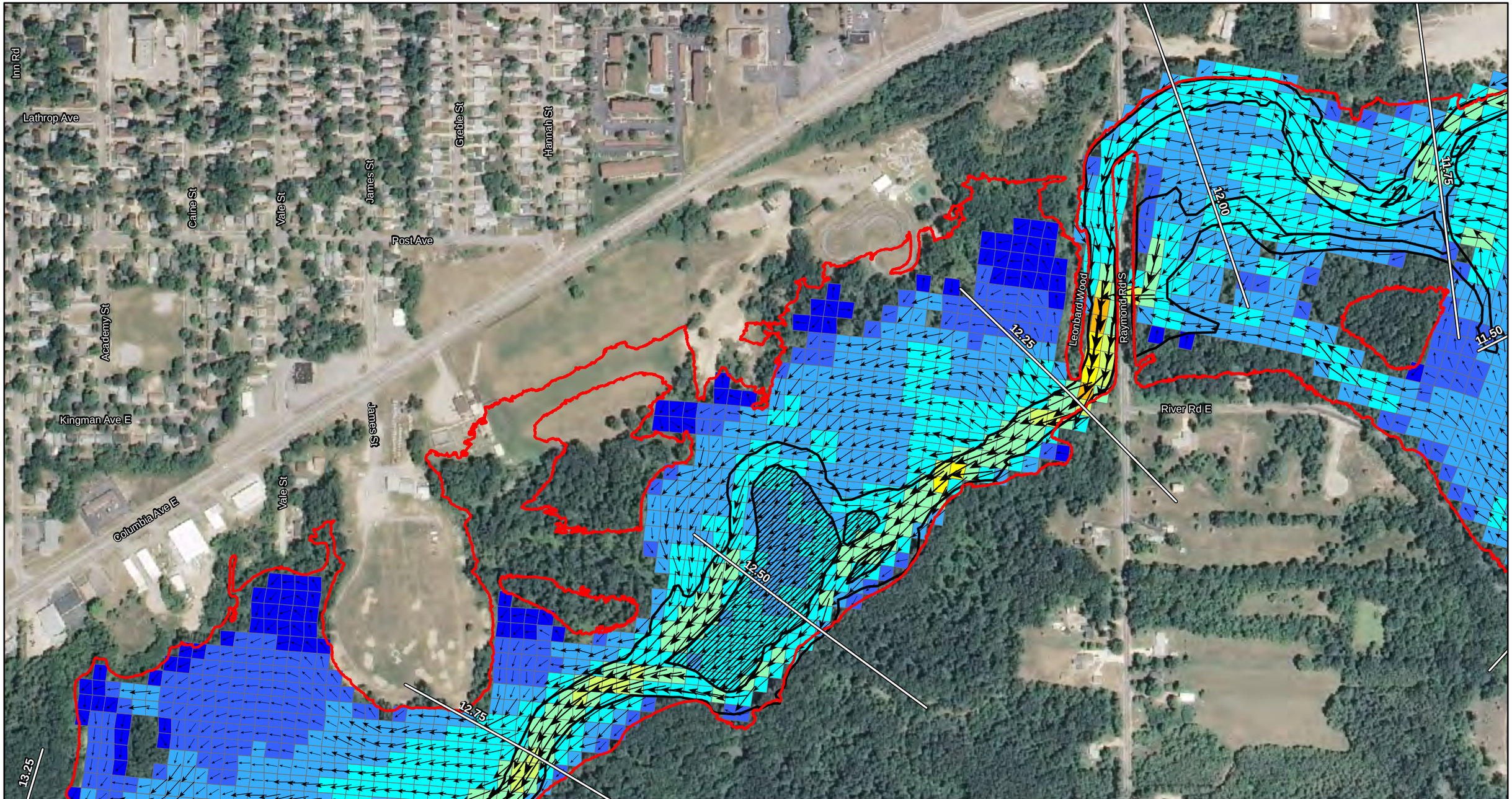
MP 10.80 - MP 11.70

SHEET 10 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
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ft/sec = Feet Per Second
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N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

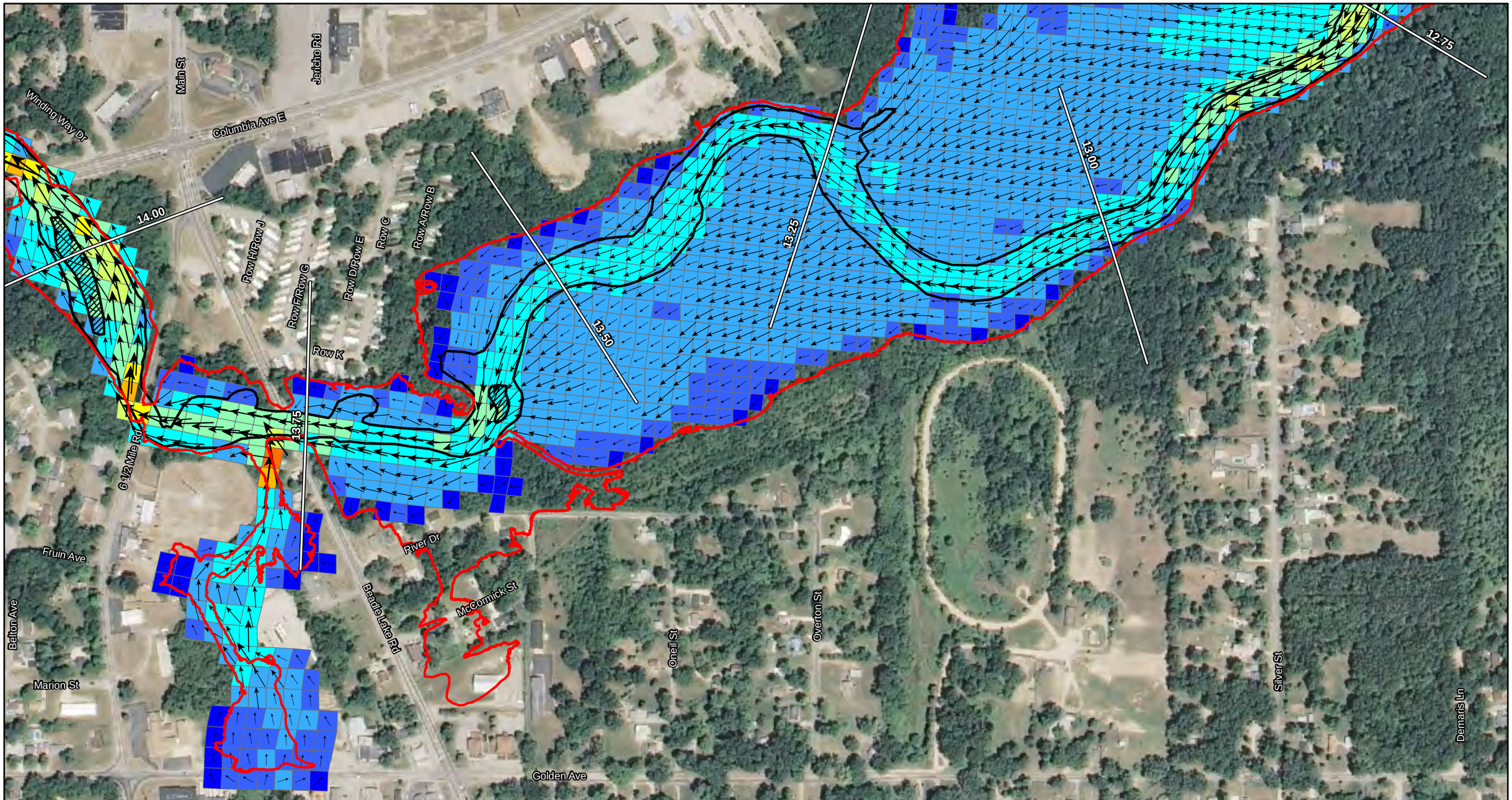
MP 11.70 - MP 12.77

SHEET 11 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

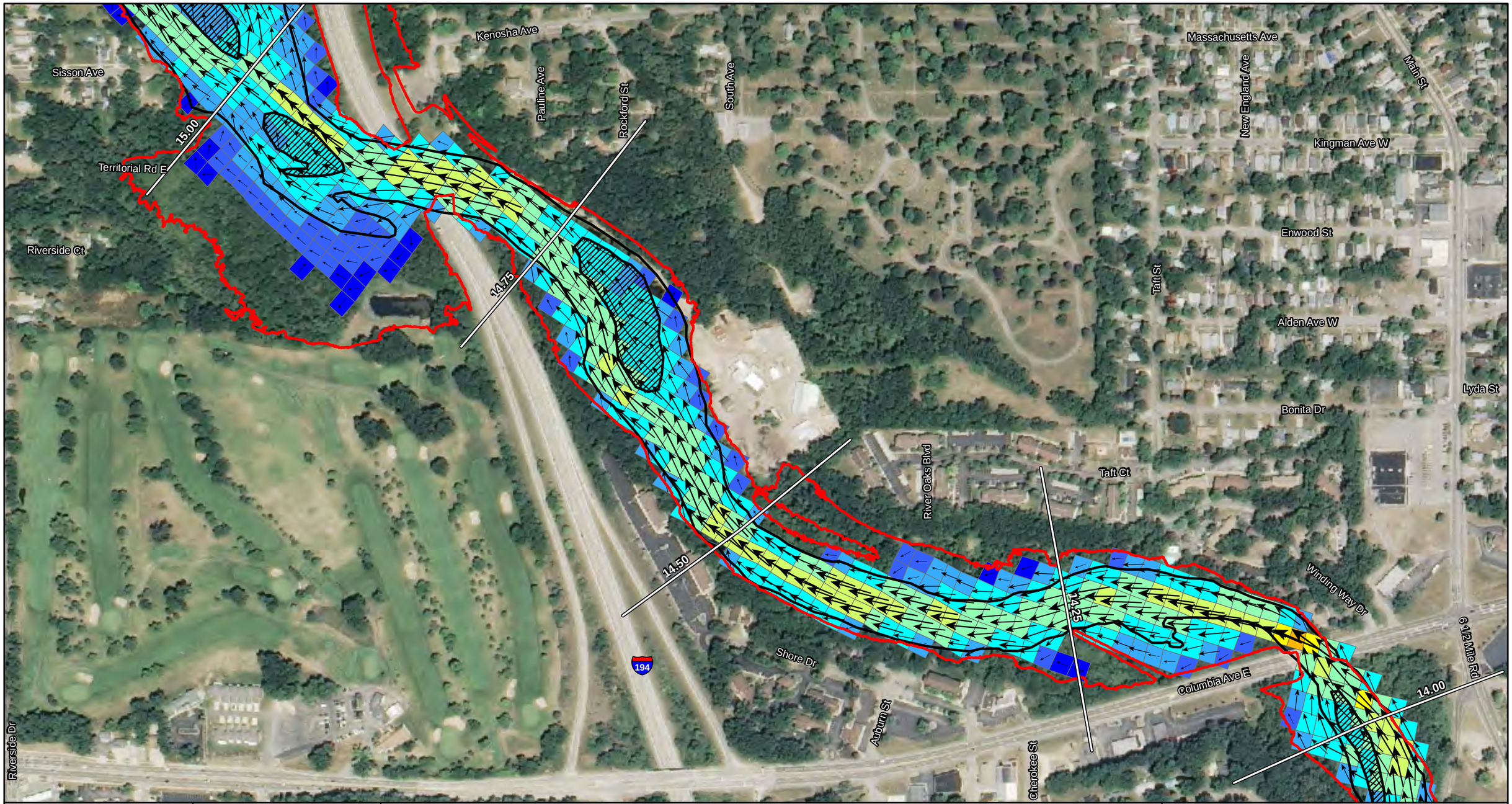
MP 12.77 - MP 14.00

SHEET 12 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

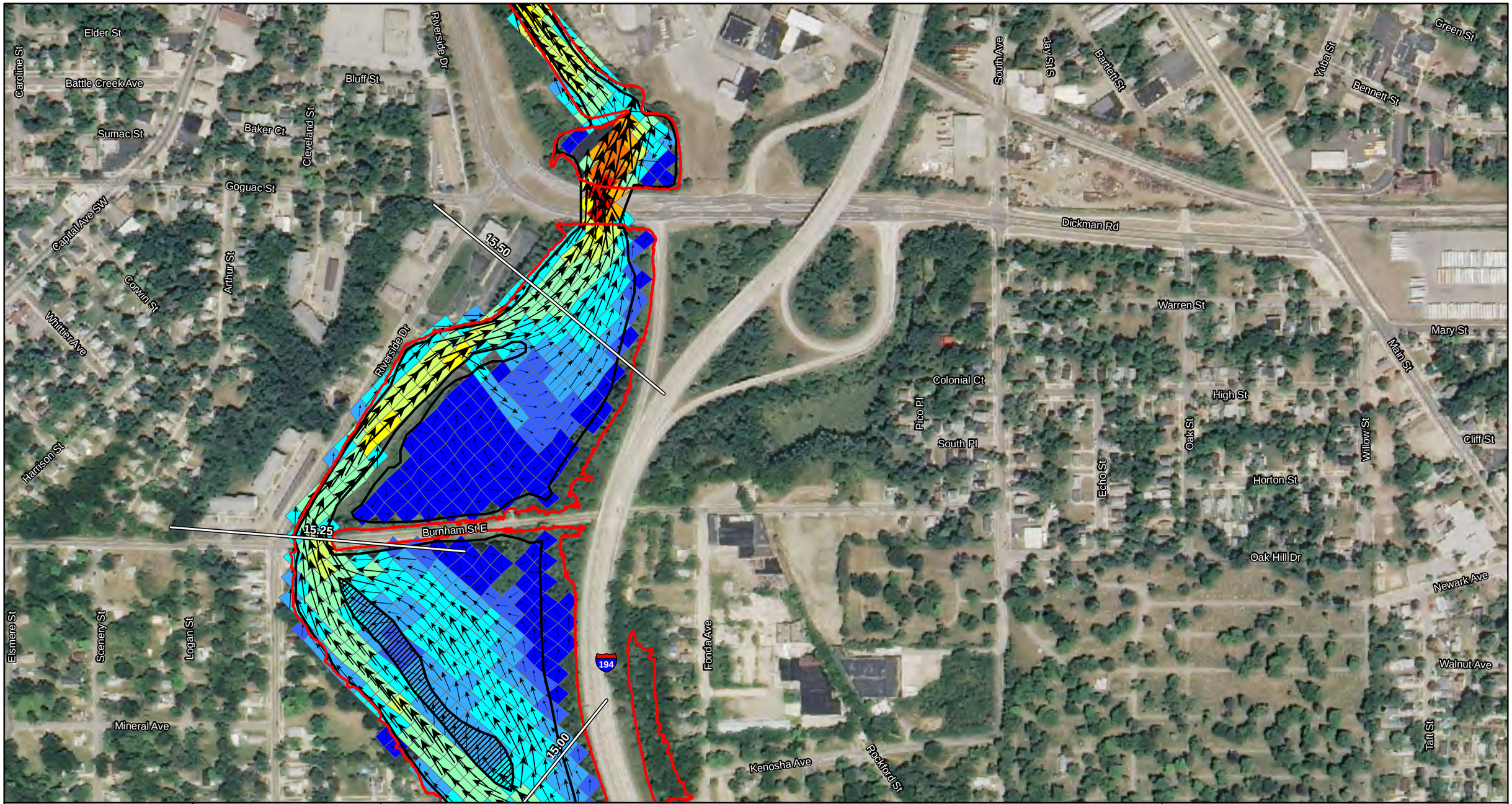
MP 14.00 - MP 15.05

SHEET 13 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

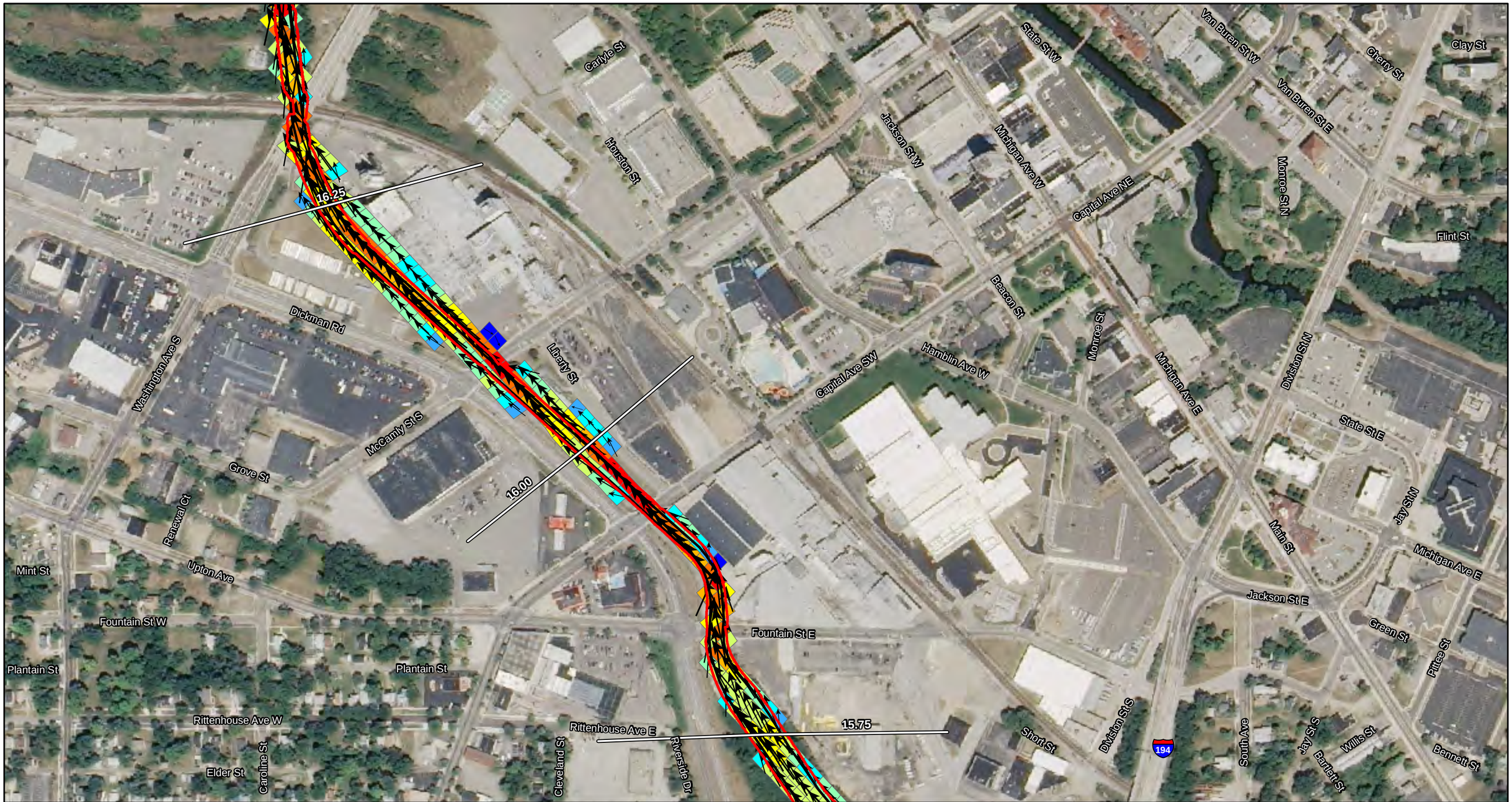
MP 15.05 - MP 15.71

SHEET 14 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
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ft/sec = Feet Per Second
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N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

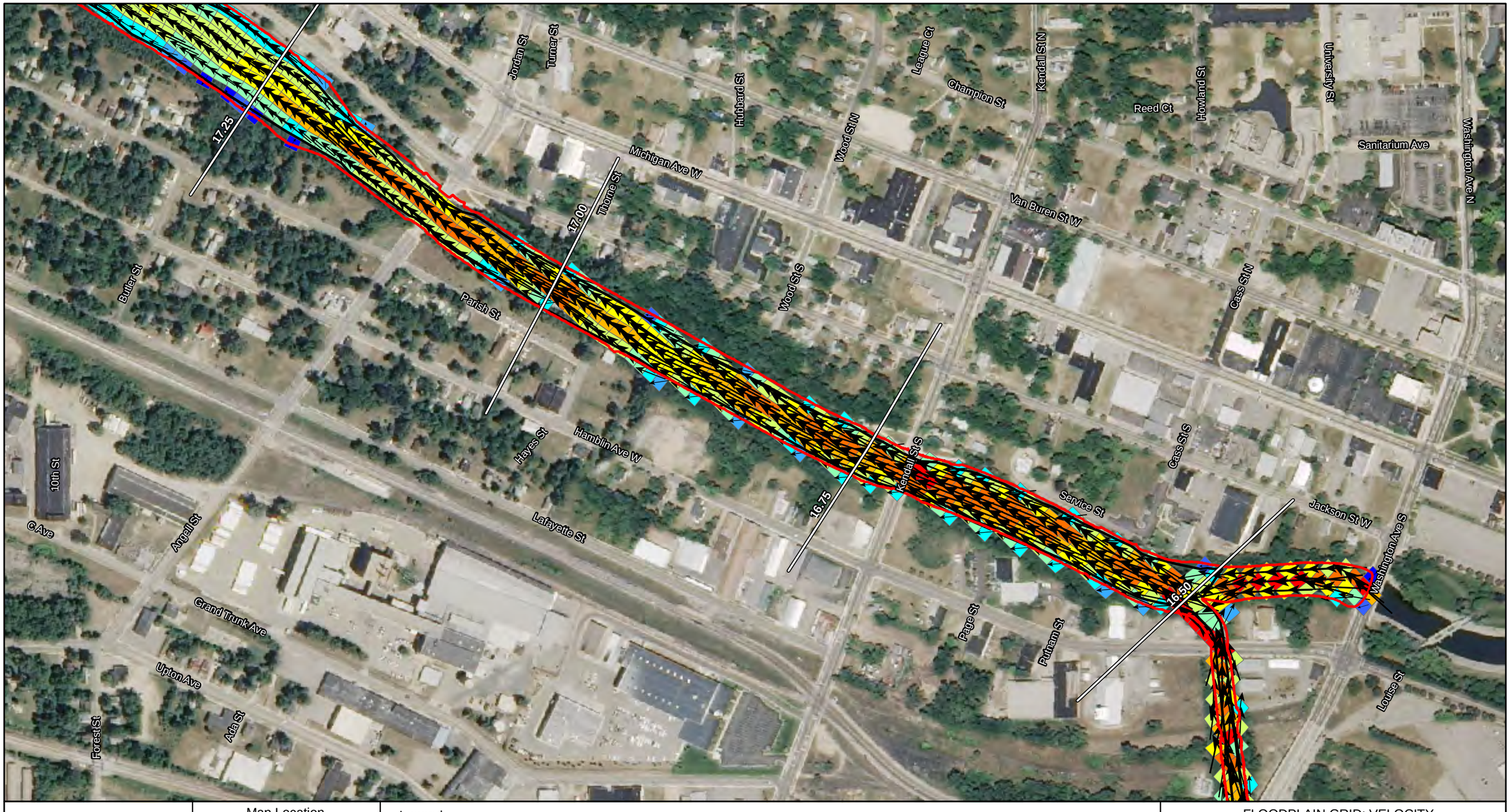
MP 15.71 - MP 16.38

SHEET 15 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

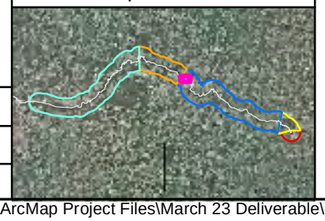
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Aerial Photography Date: July & August 2009



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
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Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

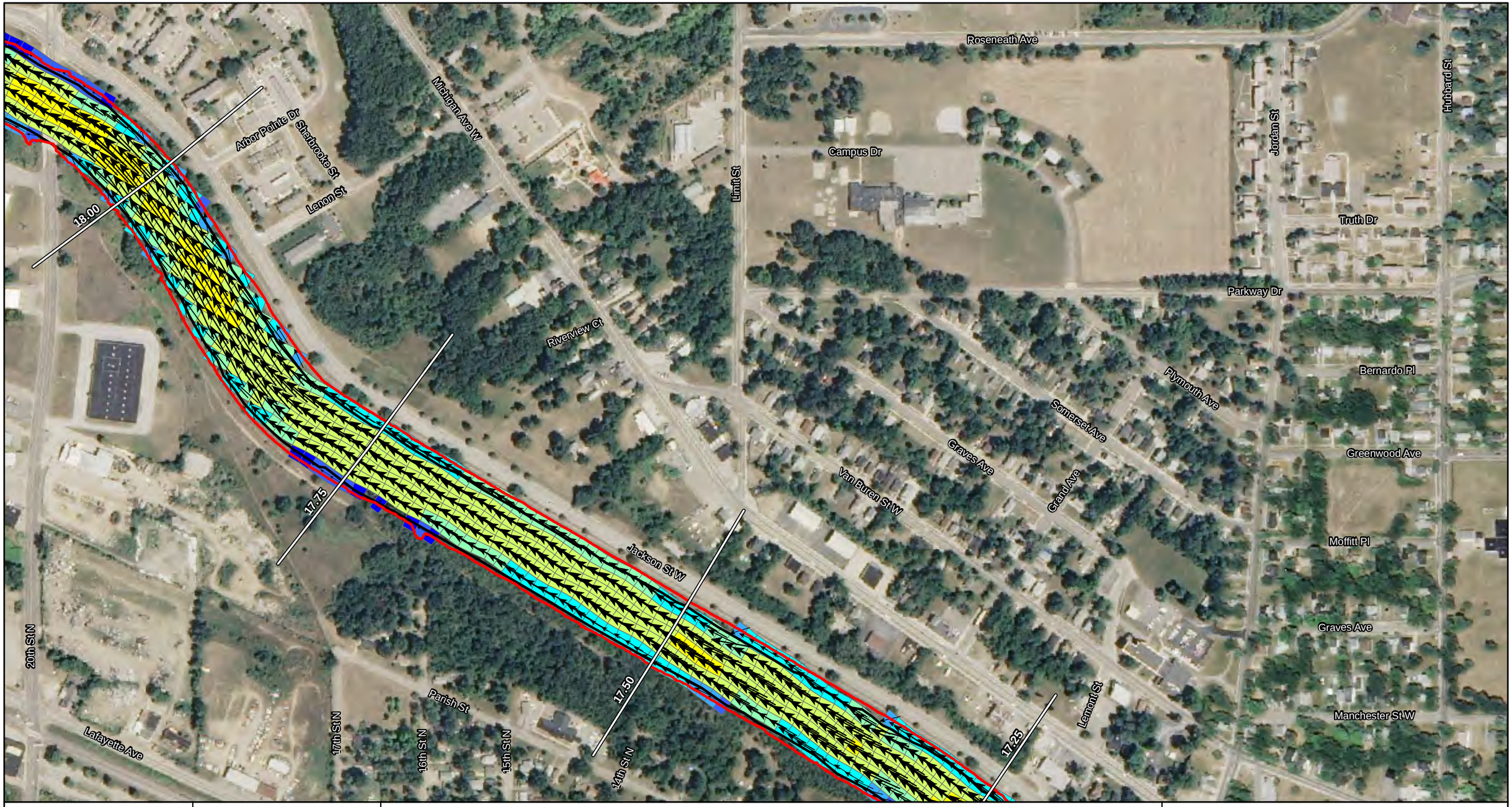
MP 16.38 - MP 17.30

SHEET 16 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May28_2011.mxd

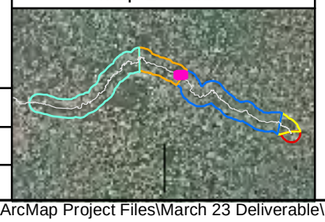
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

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0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

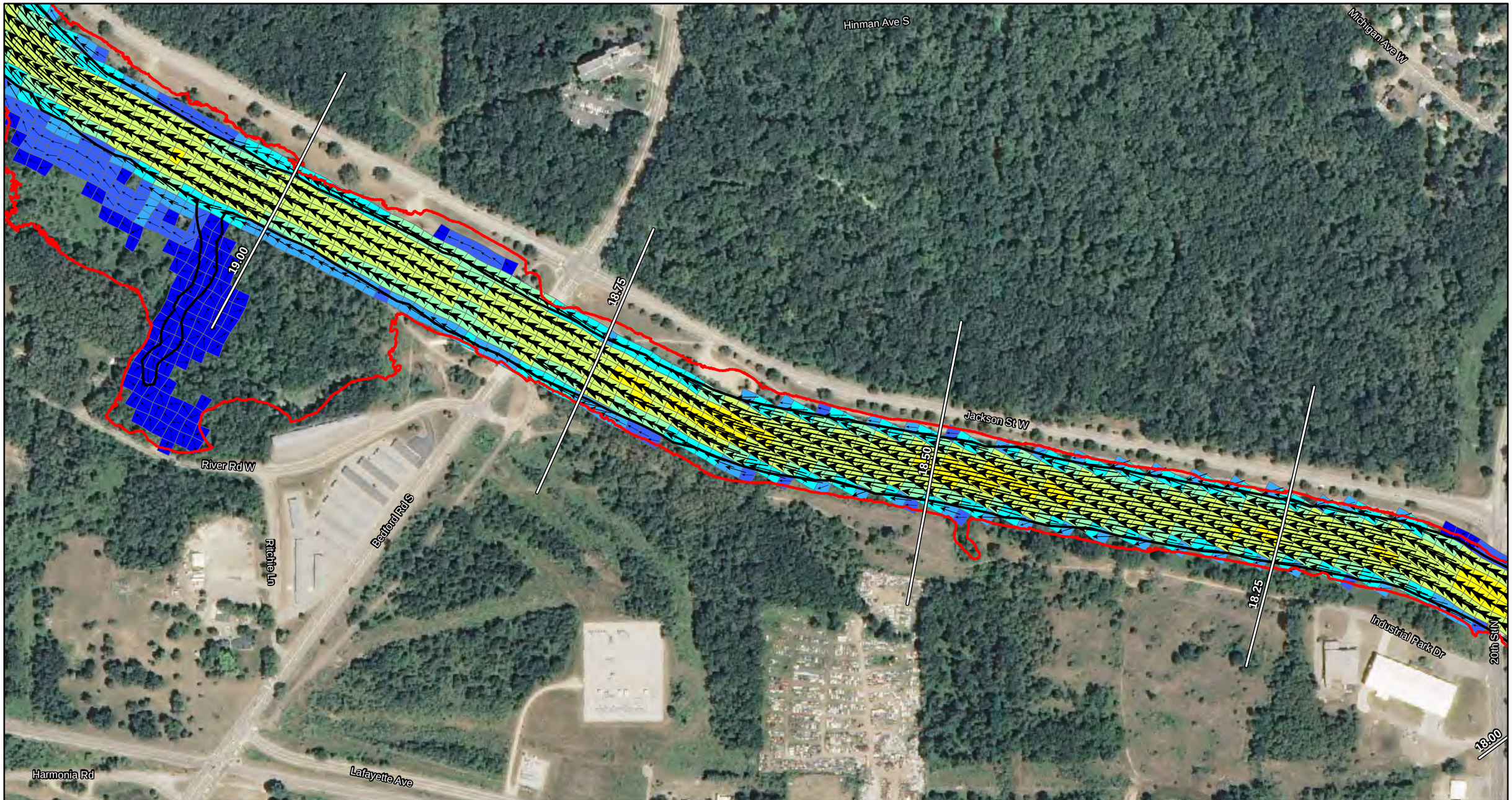
MP 17.30 - MP 18.11

SHEET 17 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

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Map Location



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Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

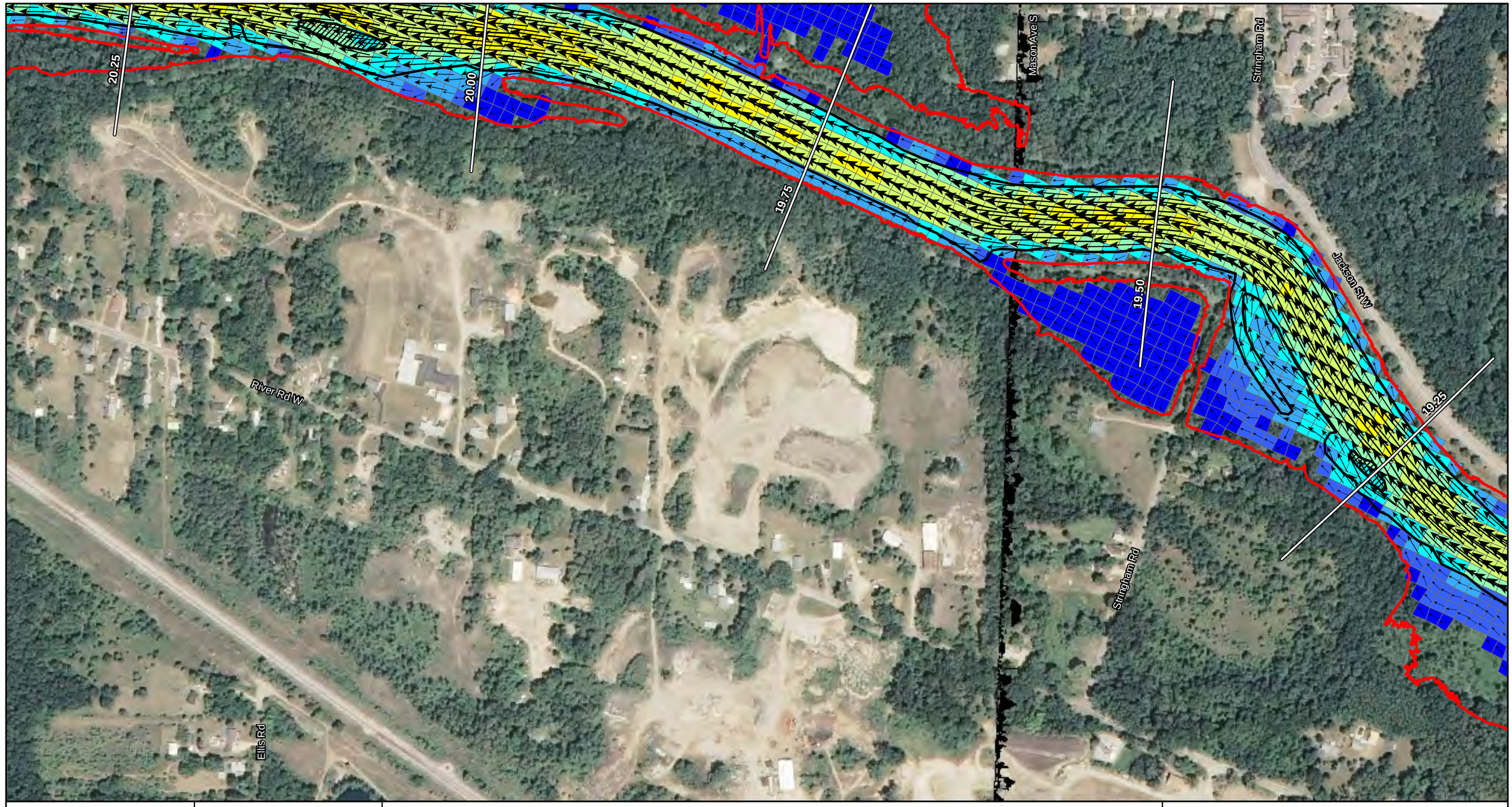
MP 18.11 - MP 19.18

SHEET 18 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May28_2011.mxd

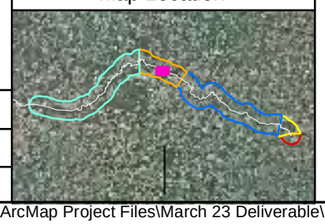
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

MP 19.18 - MP 20.00

SHEET 19 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009

Leonard Dr
Diane St
Waupaka Dr
Snow Ave
Hussey Ave
Center St
Cross St
Prudence Ln
Bansill Dr
Lamora Ave
Mason Ave N
Cedar Ave N
Kellogg St
Sigel Ave
Ludwig Ave
Woodlawn Ave N
Broadway Blvd
Feld Ave
Michigan Ave W
Spaulding Ave W
Cedar Ave W
Lynn Dr
Ashland Ave
Stringham Rd
Iden St
Mason Ave S
Cedar Ave S
Woodlawn Ave S
Babcock St
20.25
20.00
19.75

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location

Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
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- HEC-RAS 100-Year Floodplain
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

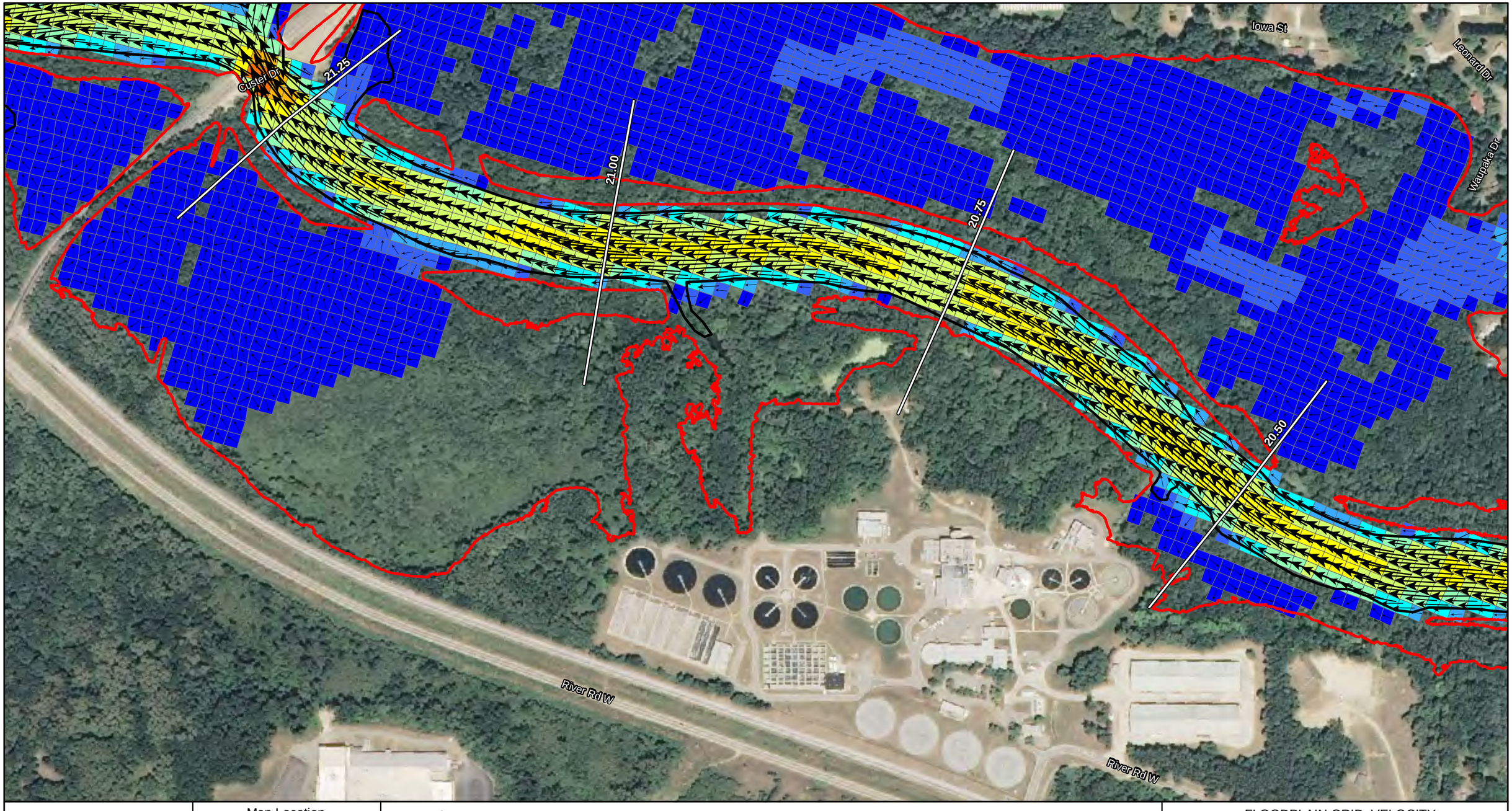
MP 20.00 - MP 20.32

SHEET 20 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May28_2011.mxd

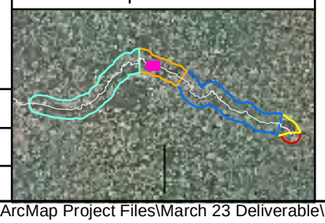
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

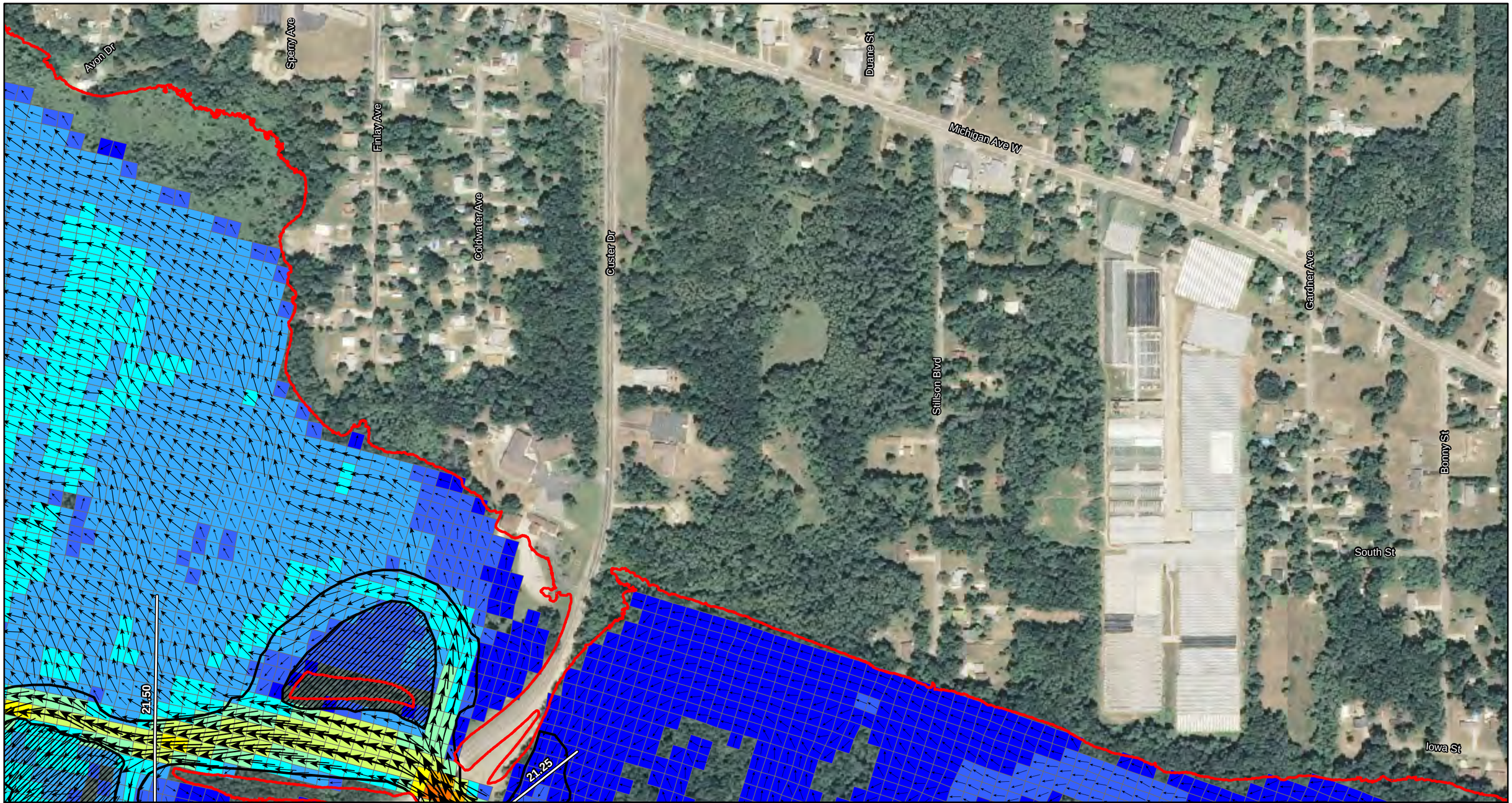
MP 20.32 - MP 21.36

SHEET 21 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May28_2011.mxd

Aerial Photography Date: July & August 2009



Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

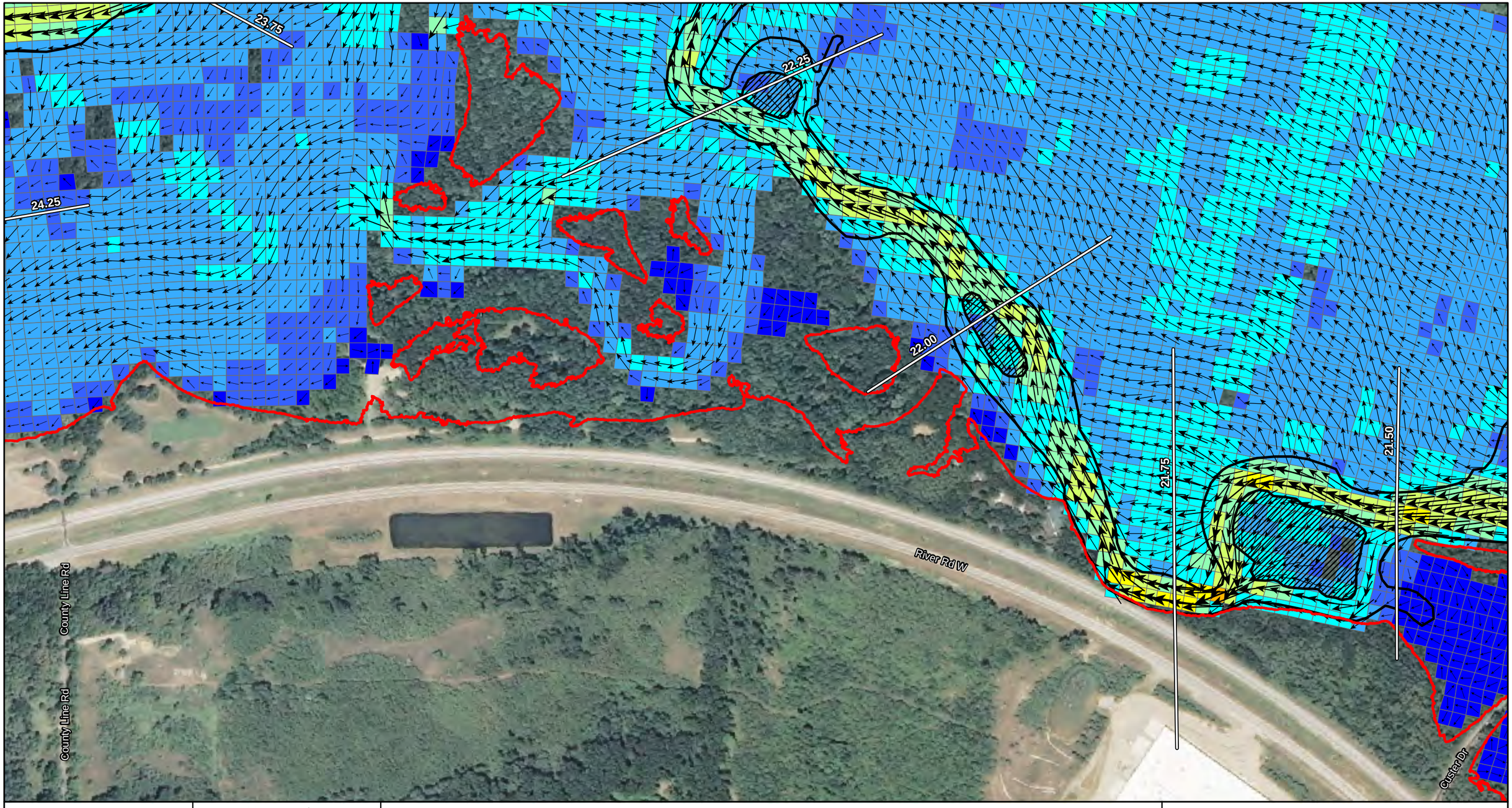
MP 21.36 - MP 21.59

SHEET 22 OF 45

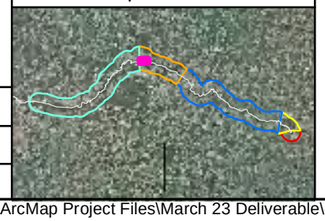
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

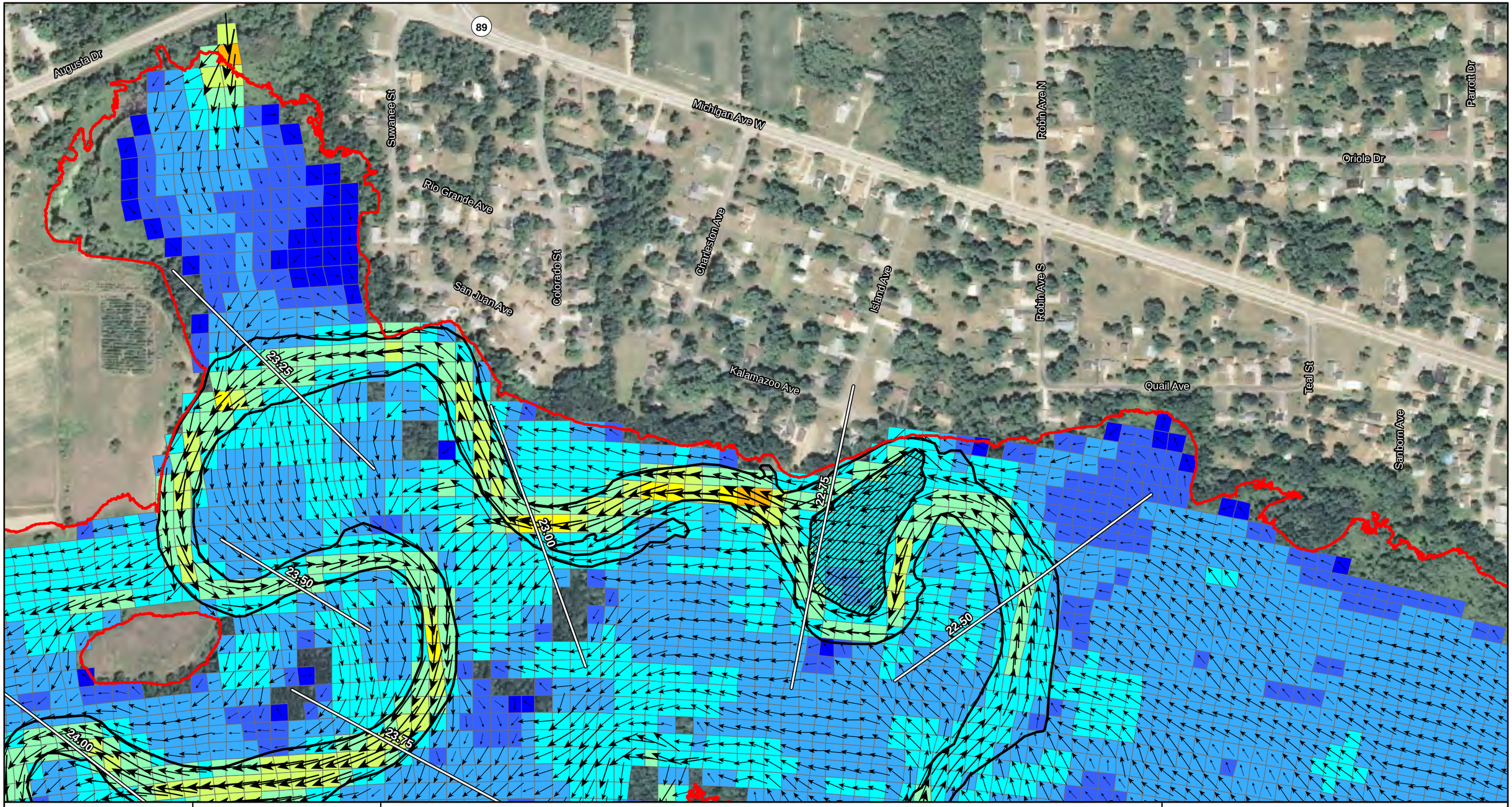
MP 21.59 - MP 22.33

SHEET 23 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May28_2011.mxd

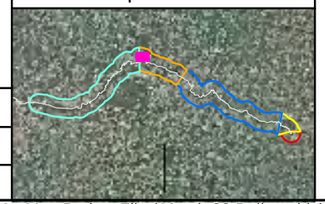
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

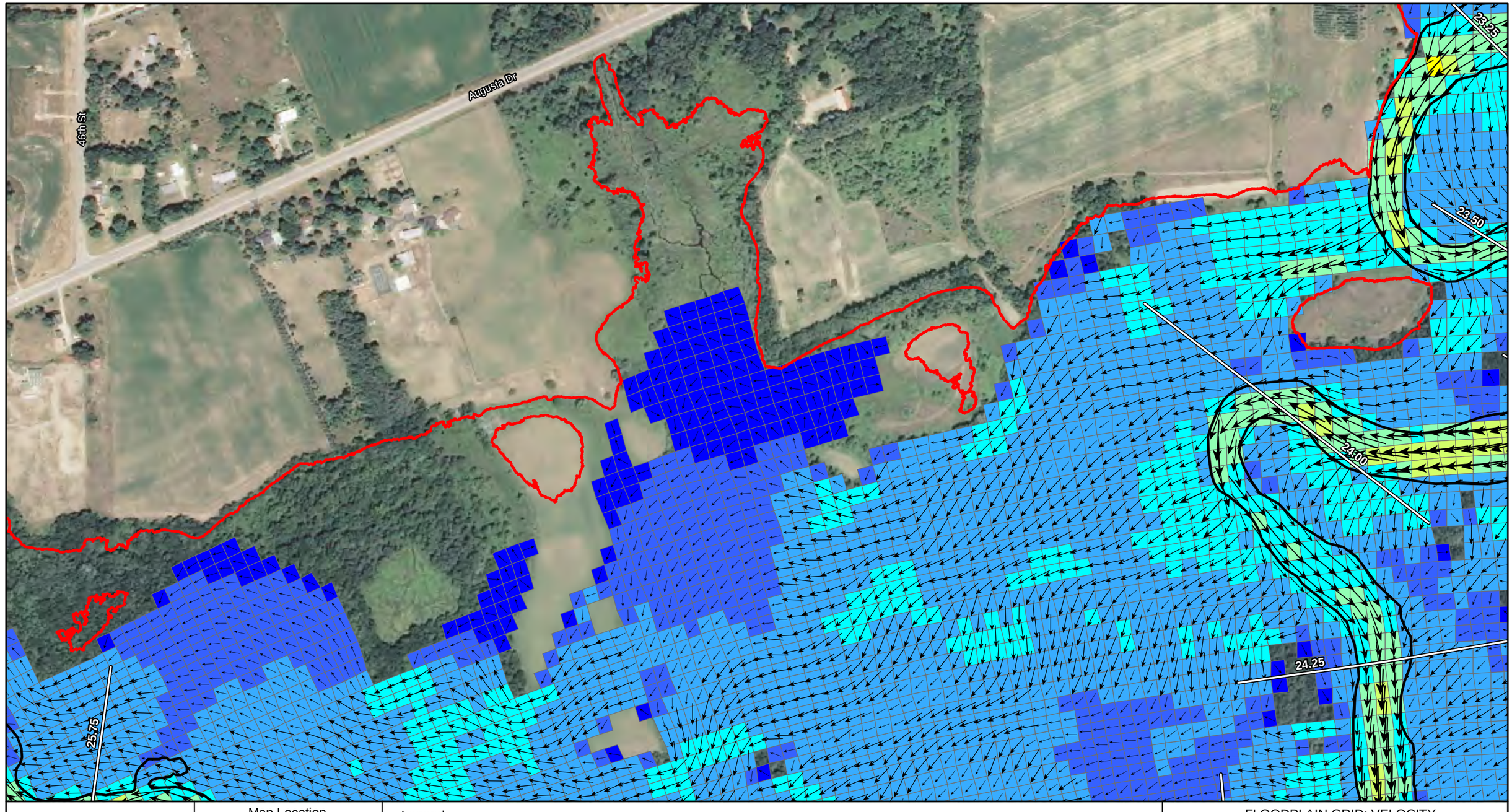
MP 22.33 - MP 24.01

SHEET 24 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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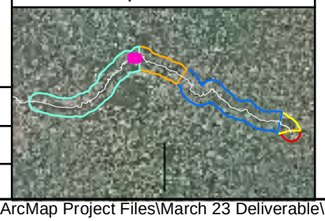
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

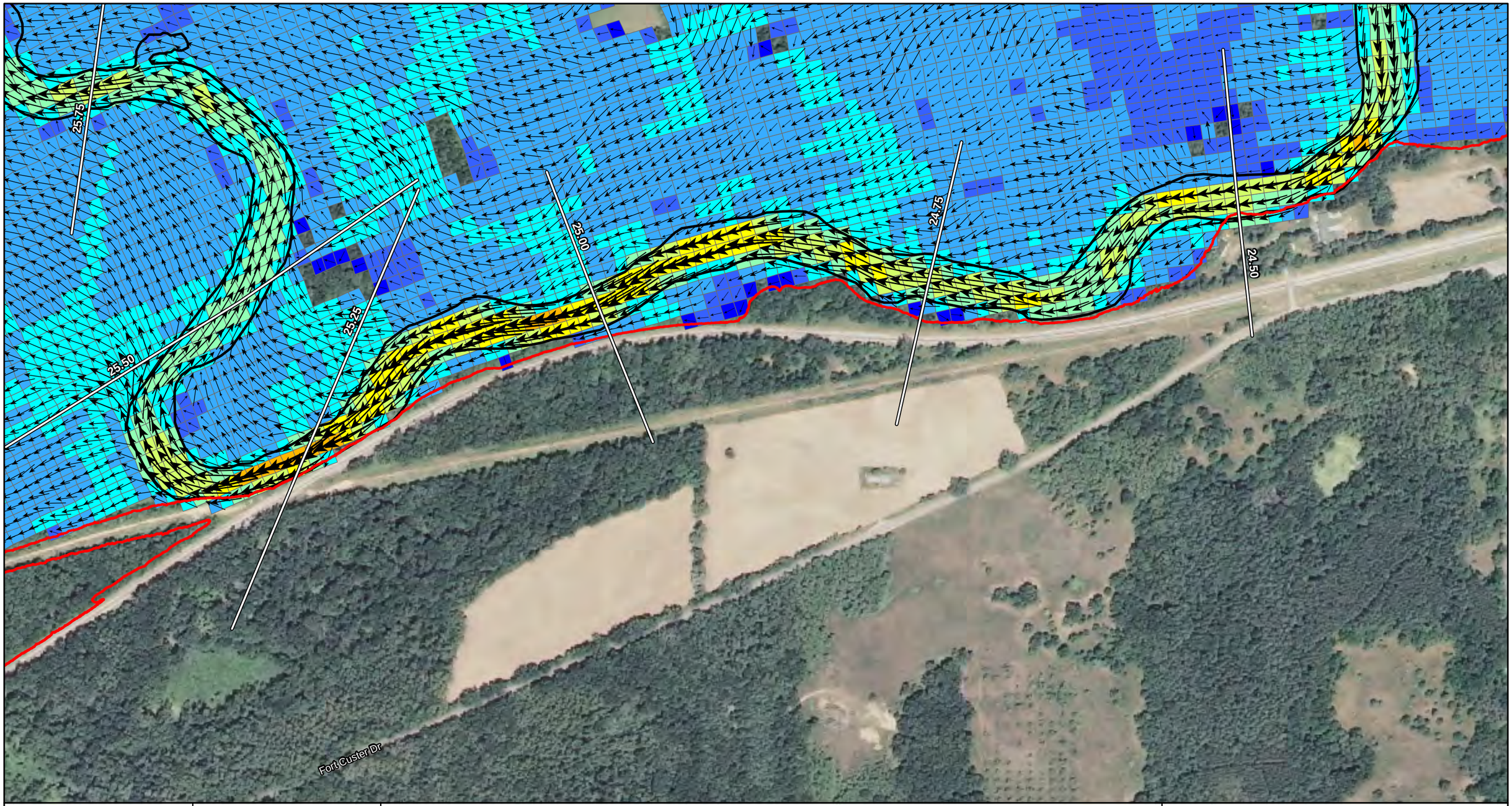
MP 24.01 - MP 24.33

SHEET 25 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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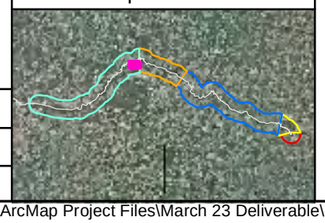
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

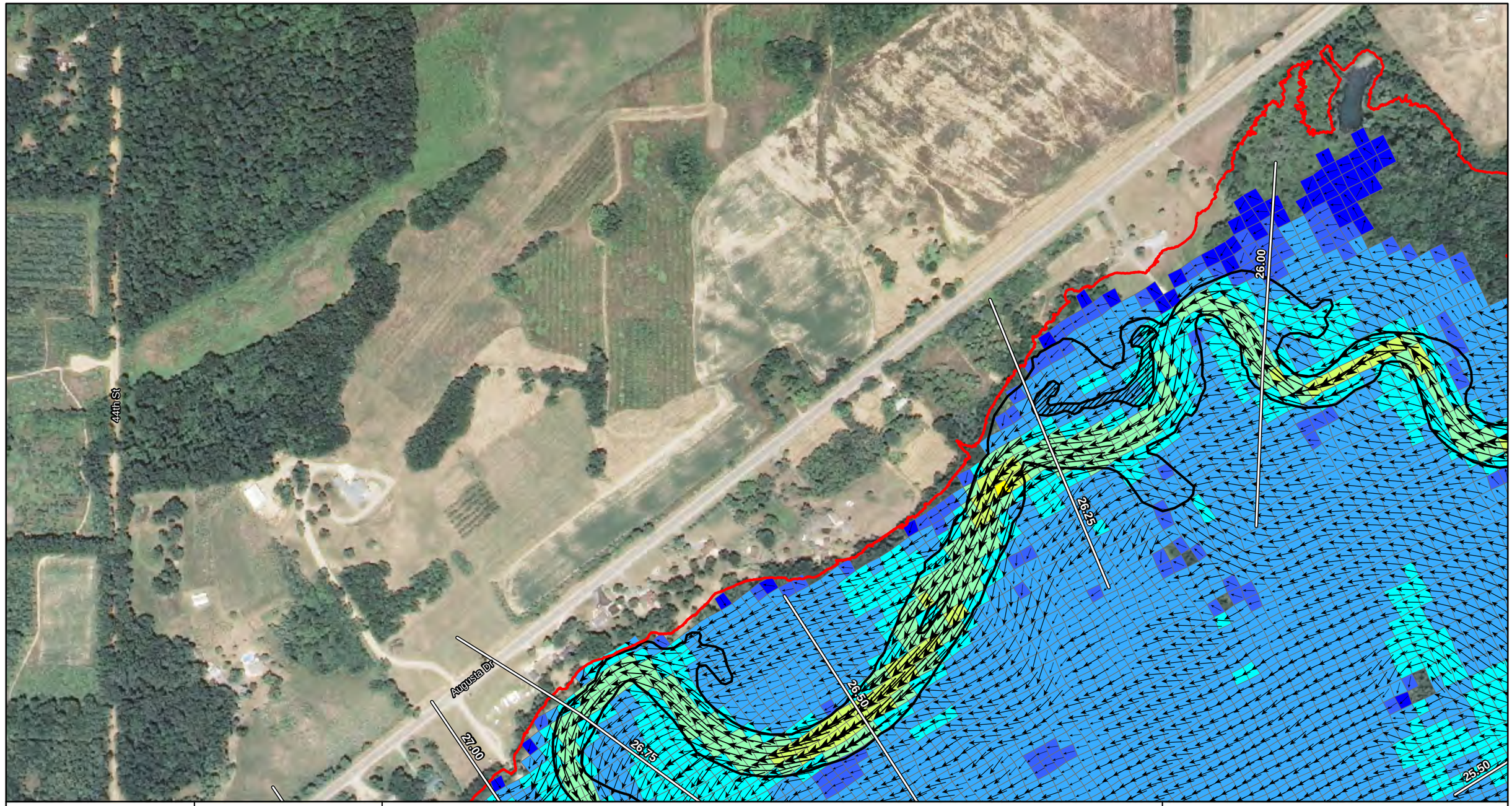
MP 24.33 - MP 25.79

SHEET 26 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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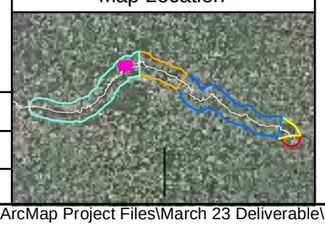
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
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- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

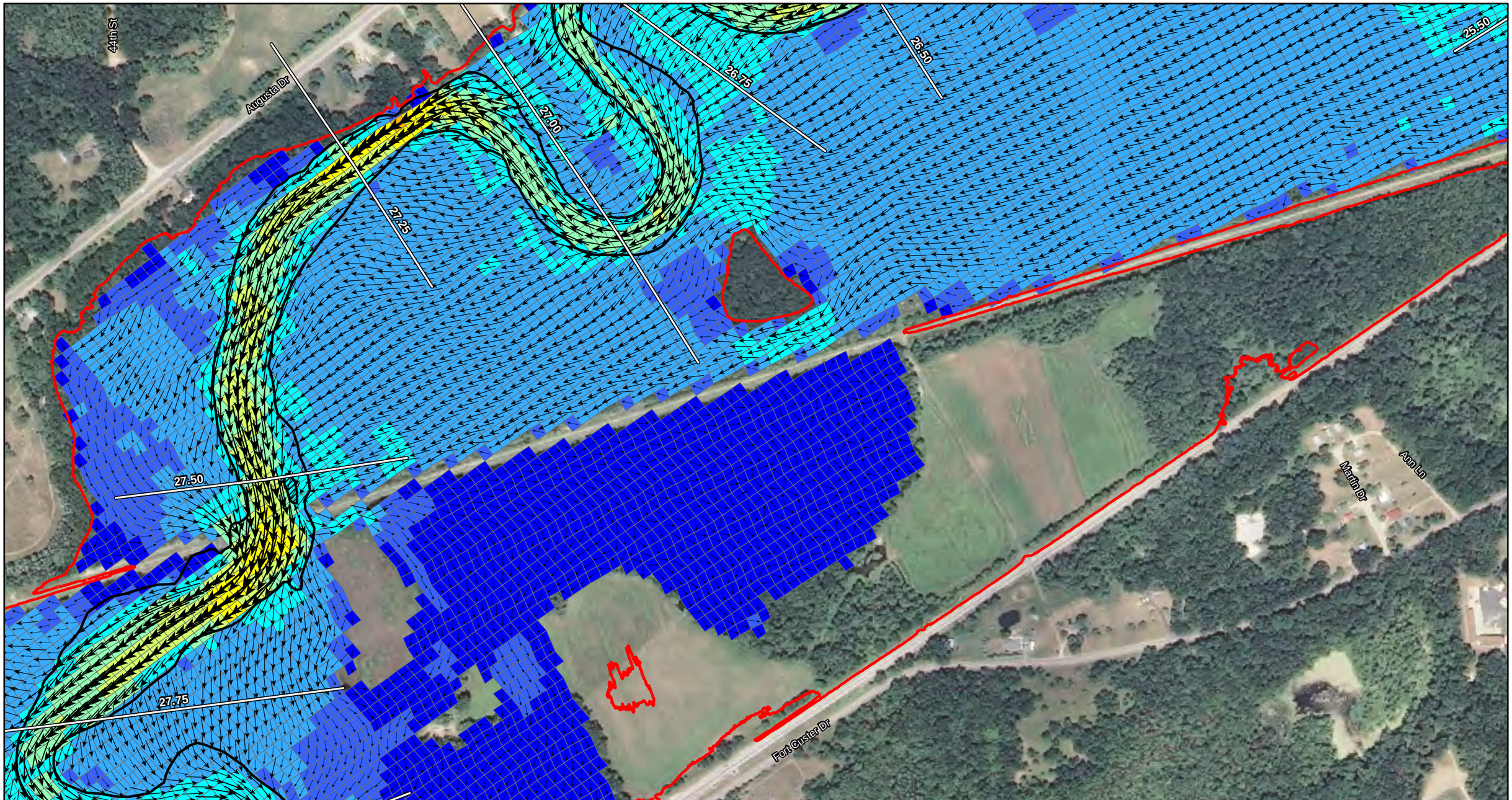
MP 25.79 - MP 26.80

SHEET 27 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

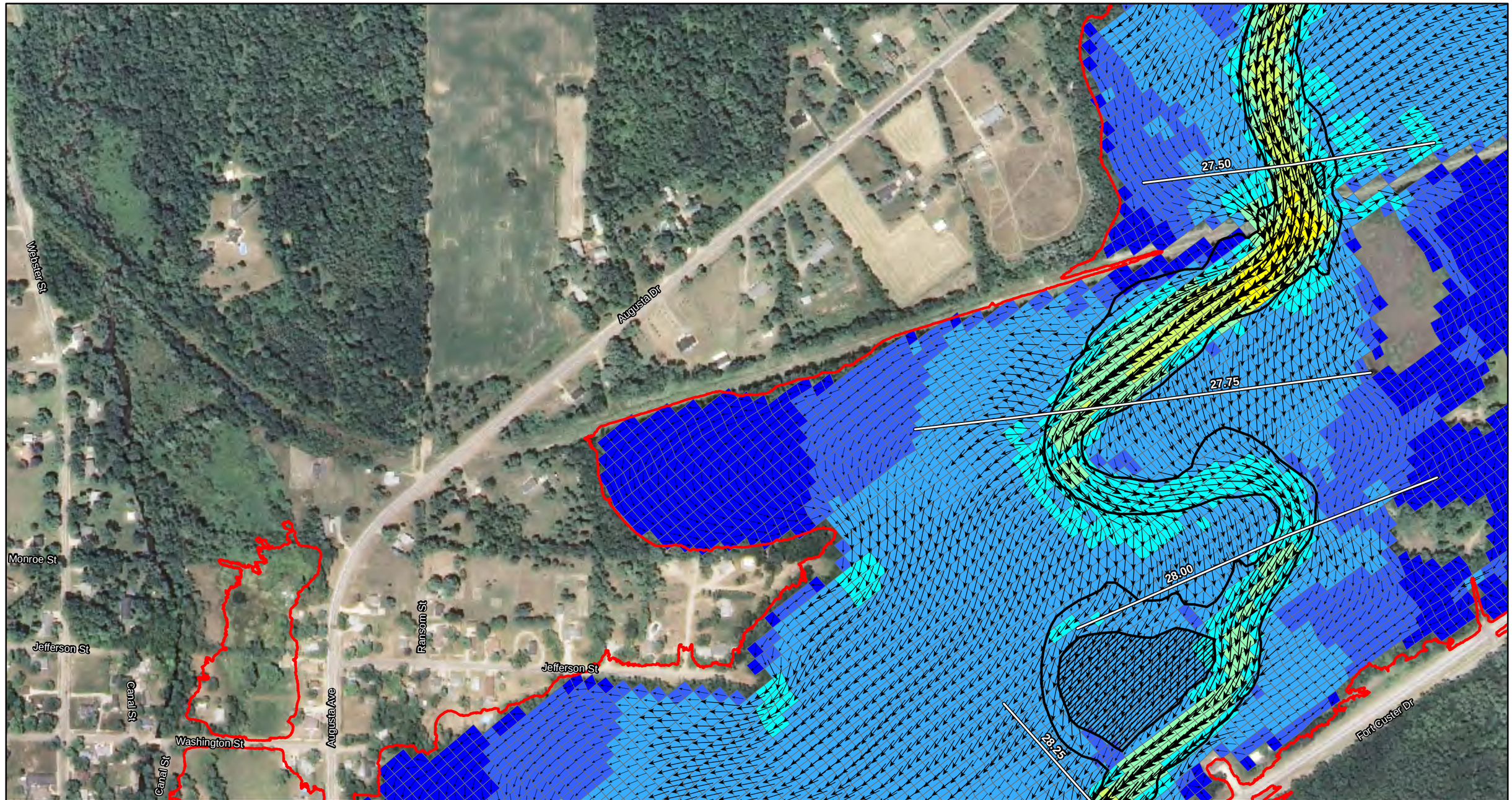
MP 26.80 - MP 27.80

SHEET 28 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May28_2011.mxd

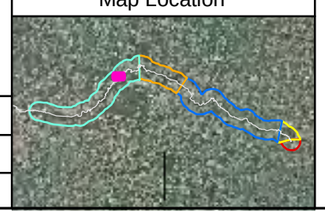
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

MP 27.80NW - MP 28.22NW

SHEET 29 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May28_2011.mxd

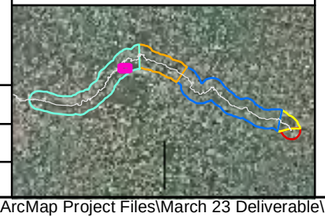
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
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- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

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Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

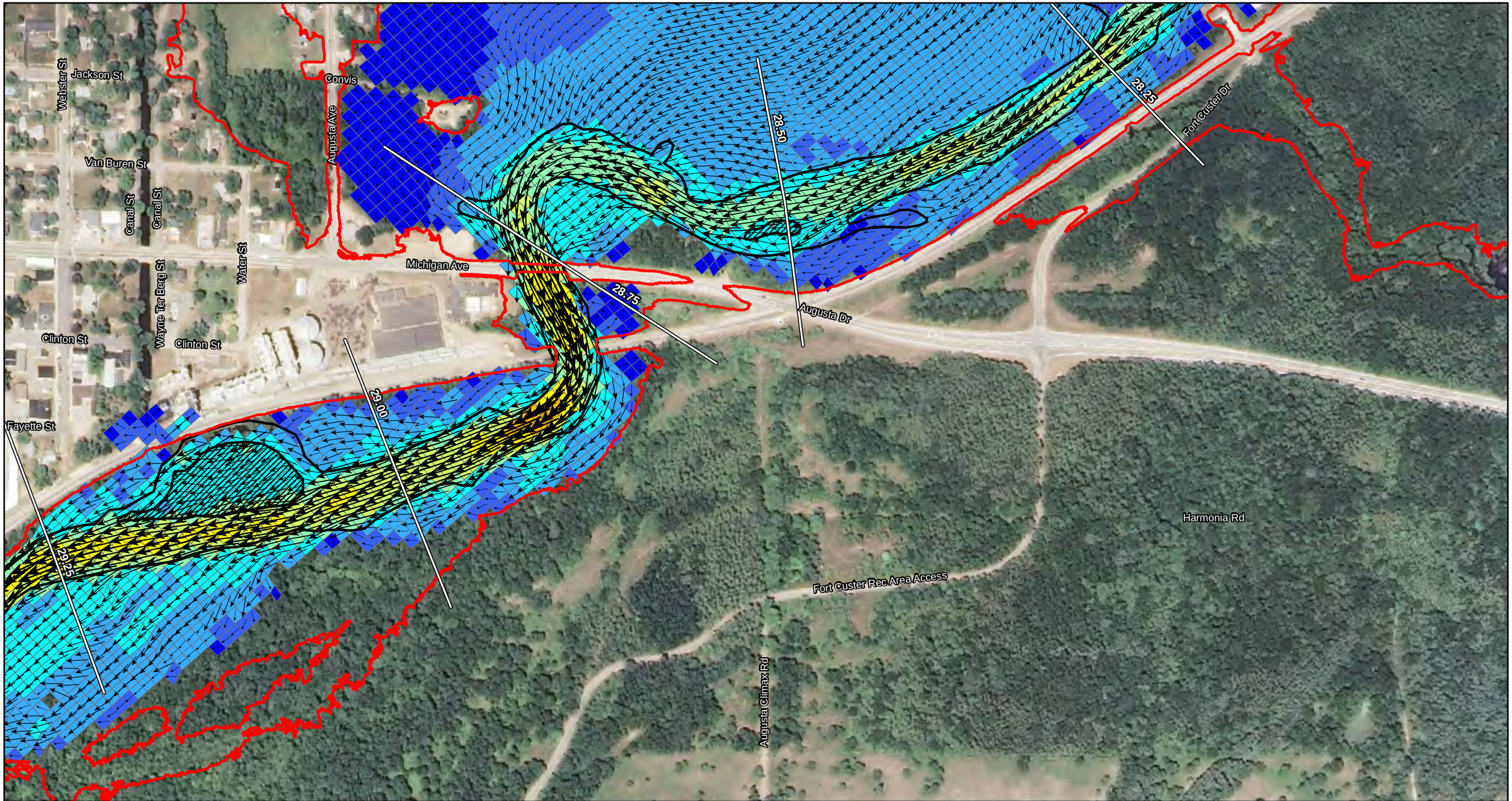
MP 27.80SE - MP 28.22SE

SHEET 30 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
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- 2.5 - 3.0 ft/sec
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

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0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

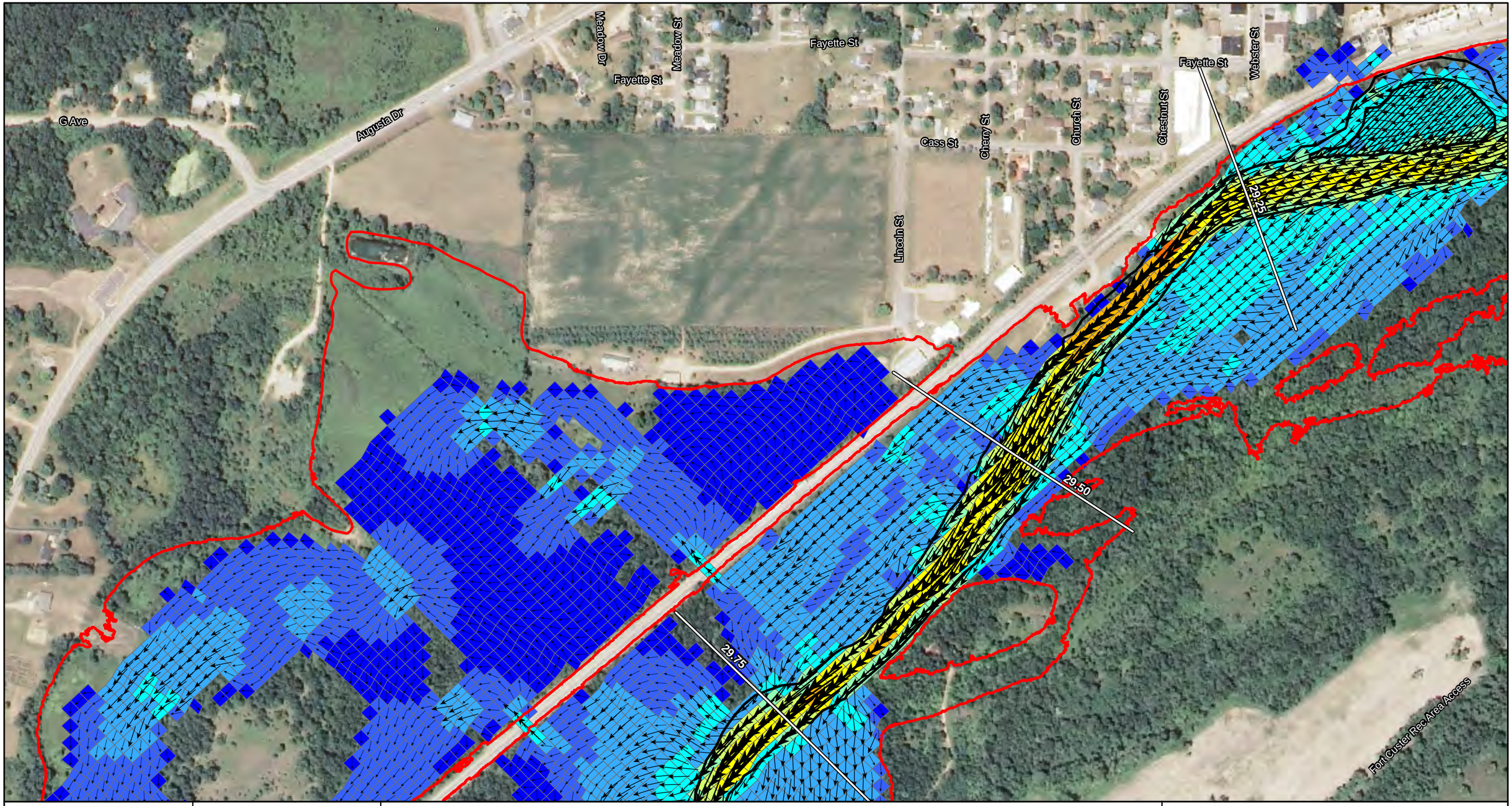
MP 28.22 - MP 29.20

SHEET 31 OF 45

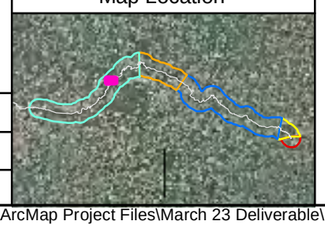
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May28_2011.mxd

Aerial Photography Date: July & August 2009



Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

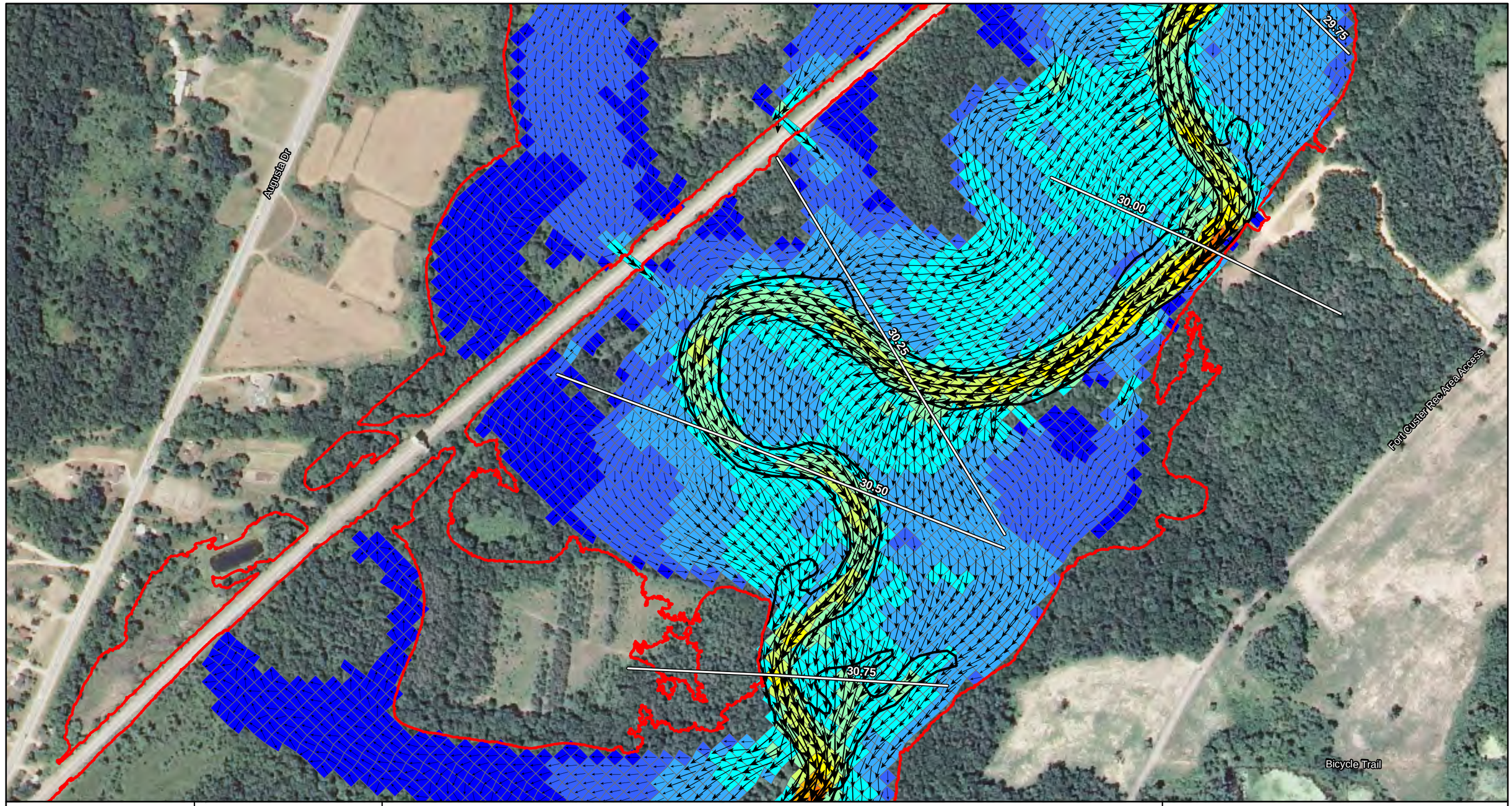
MP 29.20 - MP 29.82

SHEET 32 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May28_2011.mxd

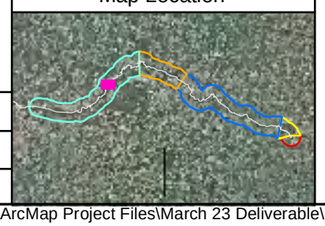
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

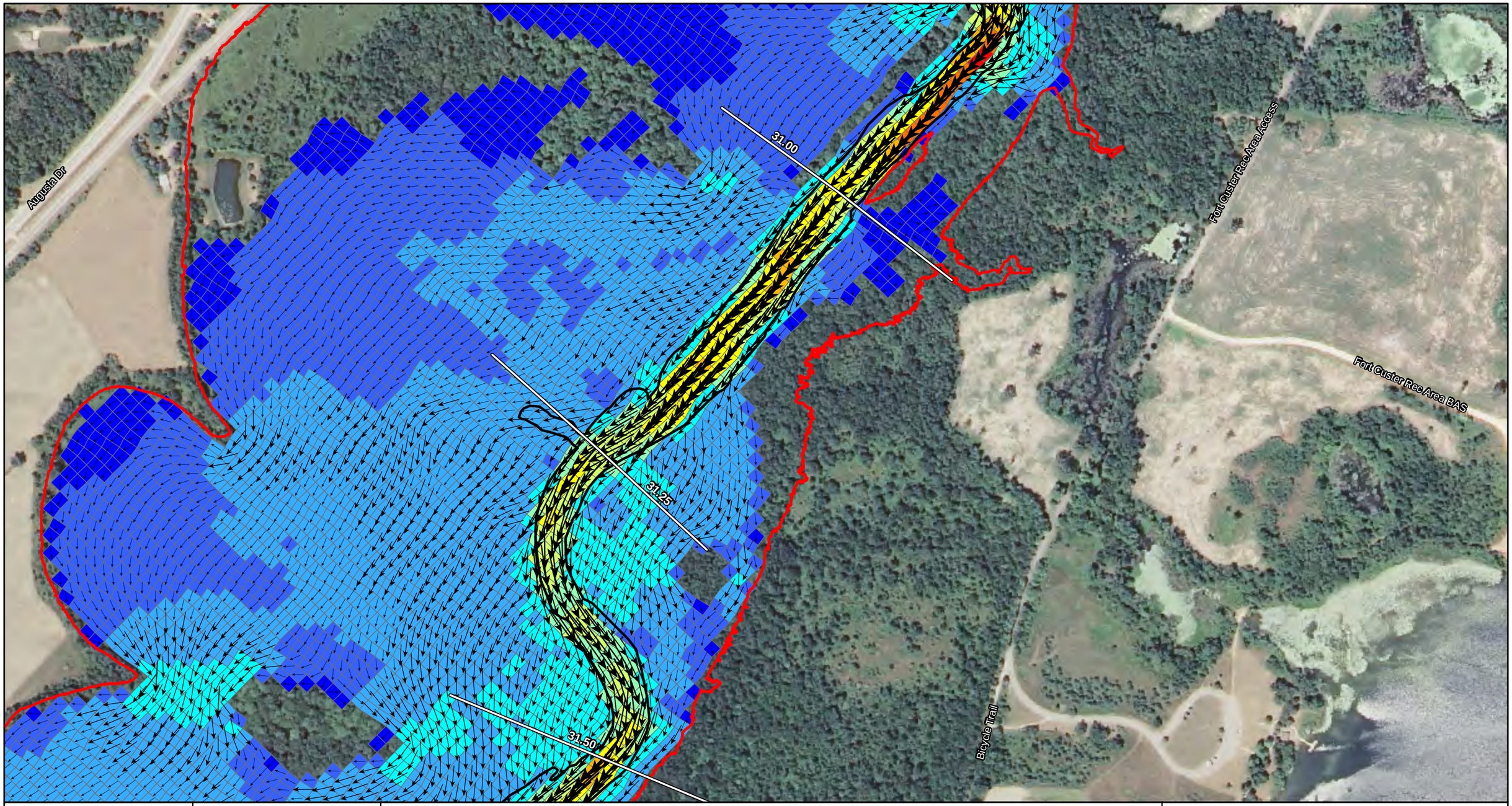
MP 29.82 - MP 30.84

SHEET 33 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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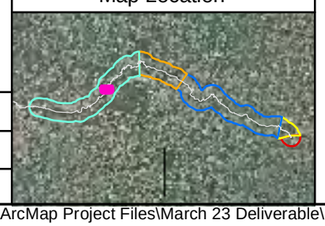
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
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- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
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N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

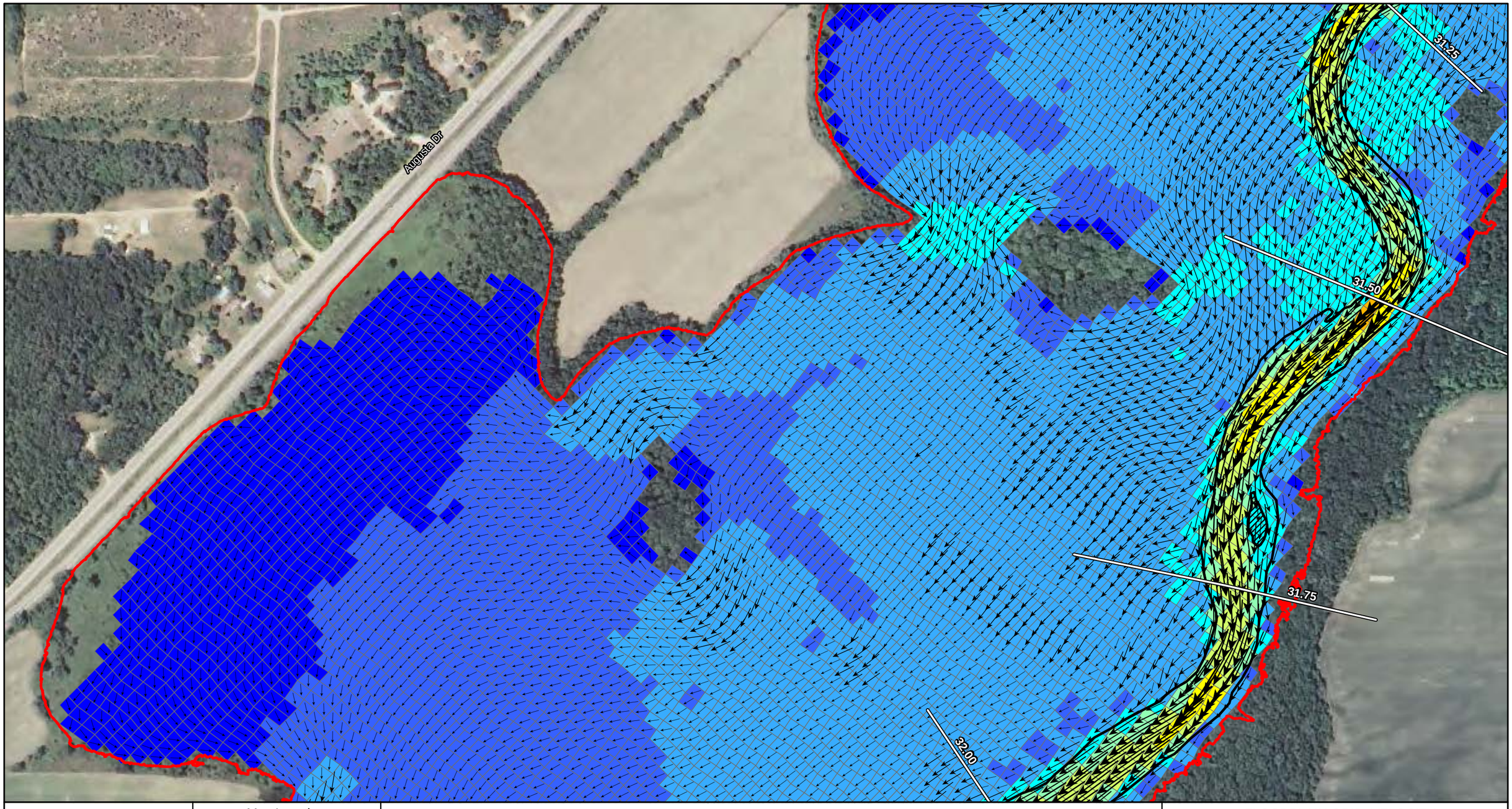
MP 30.84 - MP 31.40

SHEET 34 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

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- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
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N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

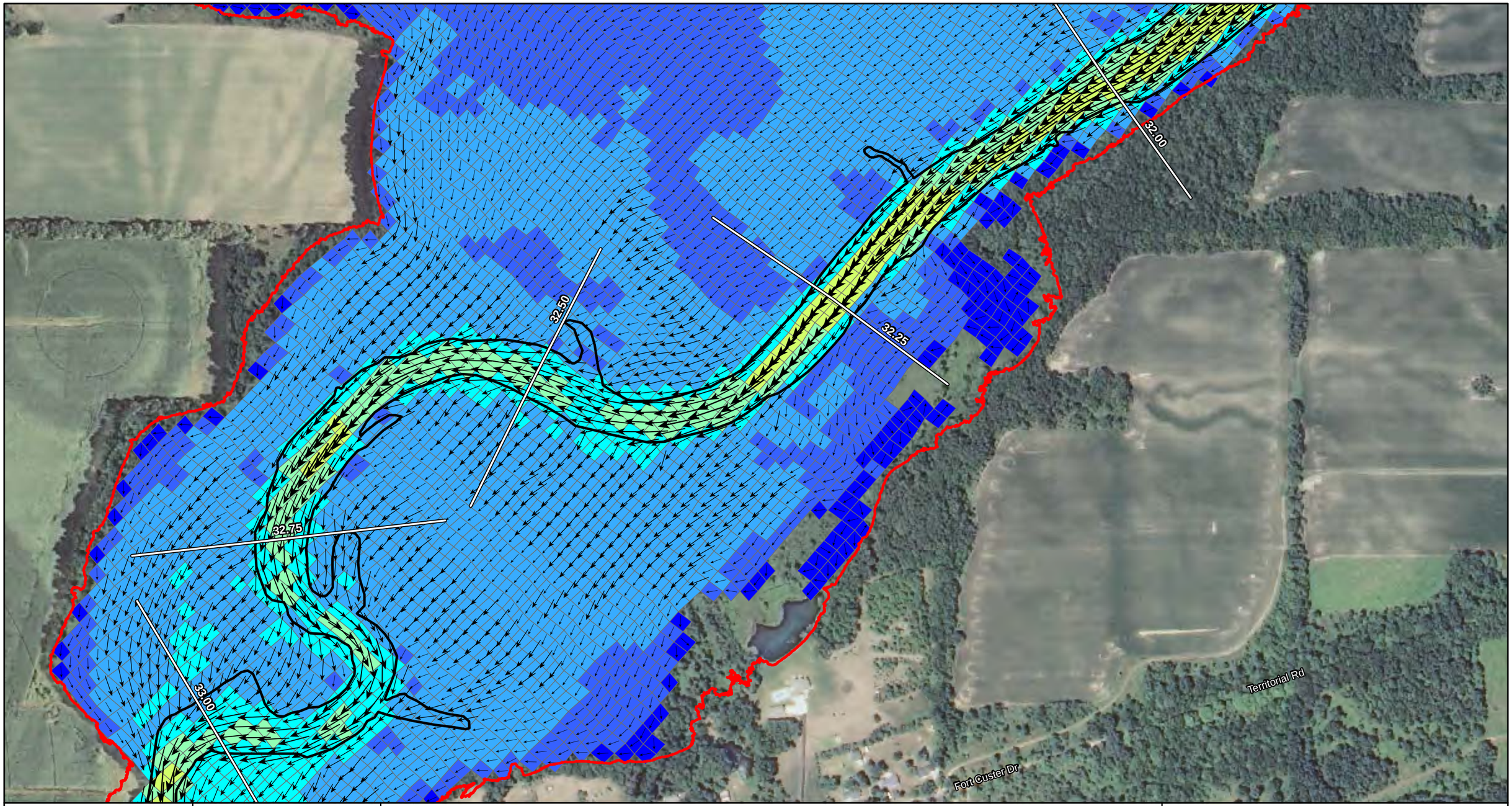
MP 31.40 - MP 31.94

SHEET 35 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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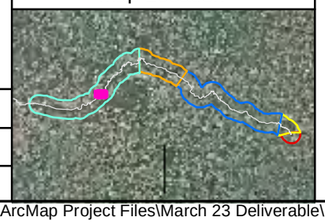
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
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cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

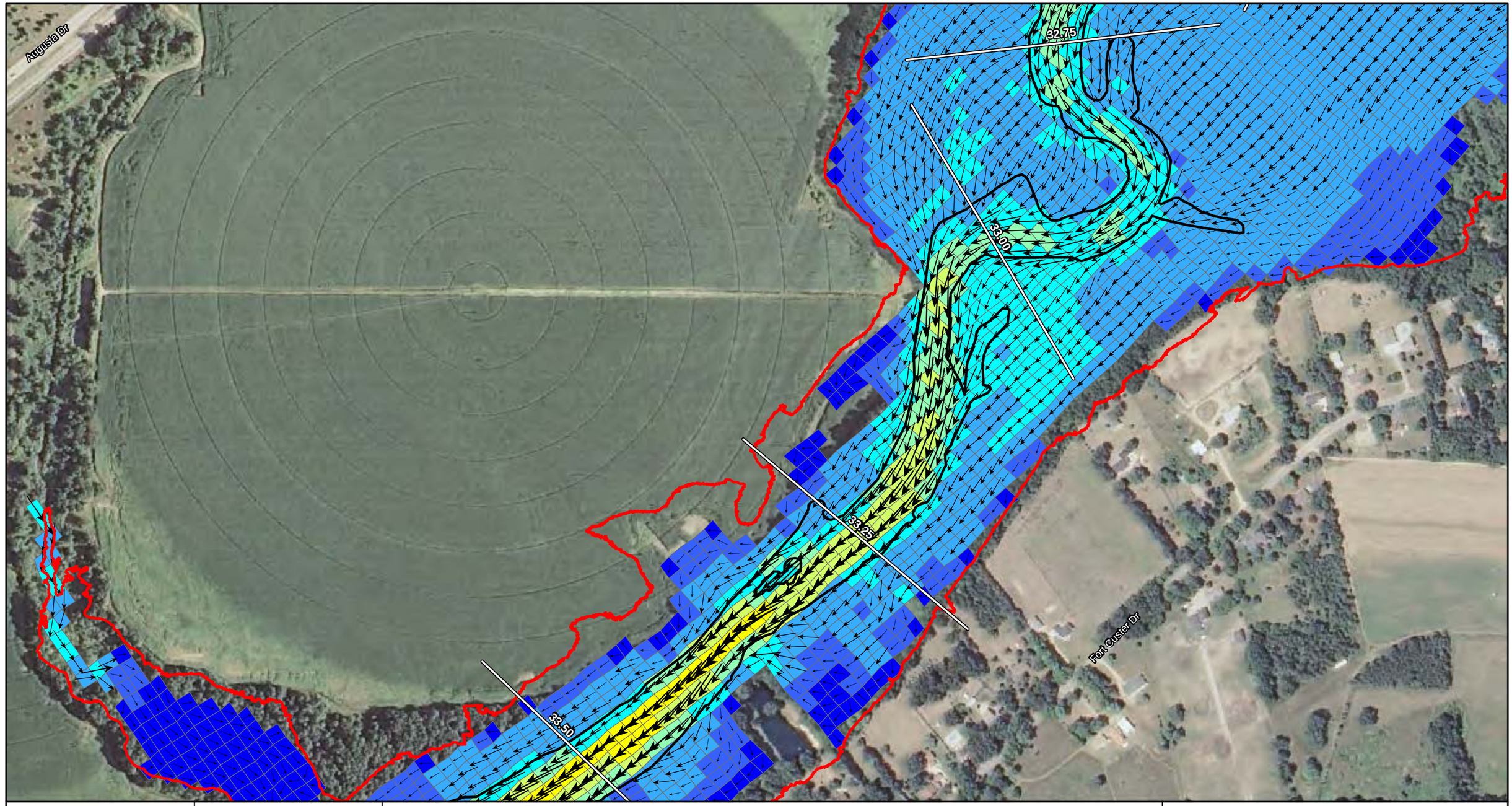
MP 31.40 - MP 31.94

SHEET 36 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May28_2011.mxd

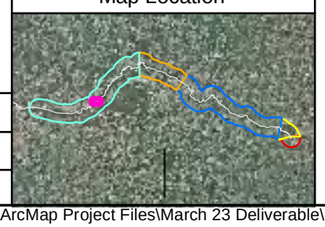
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

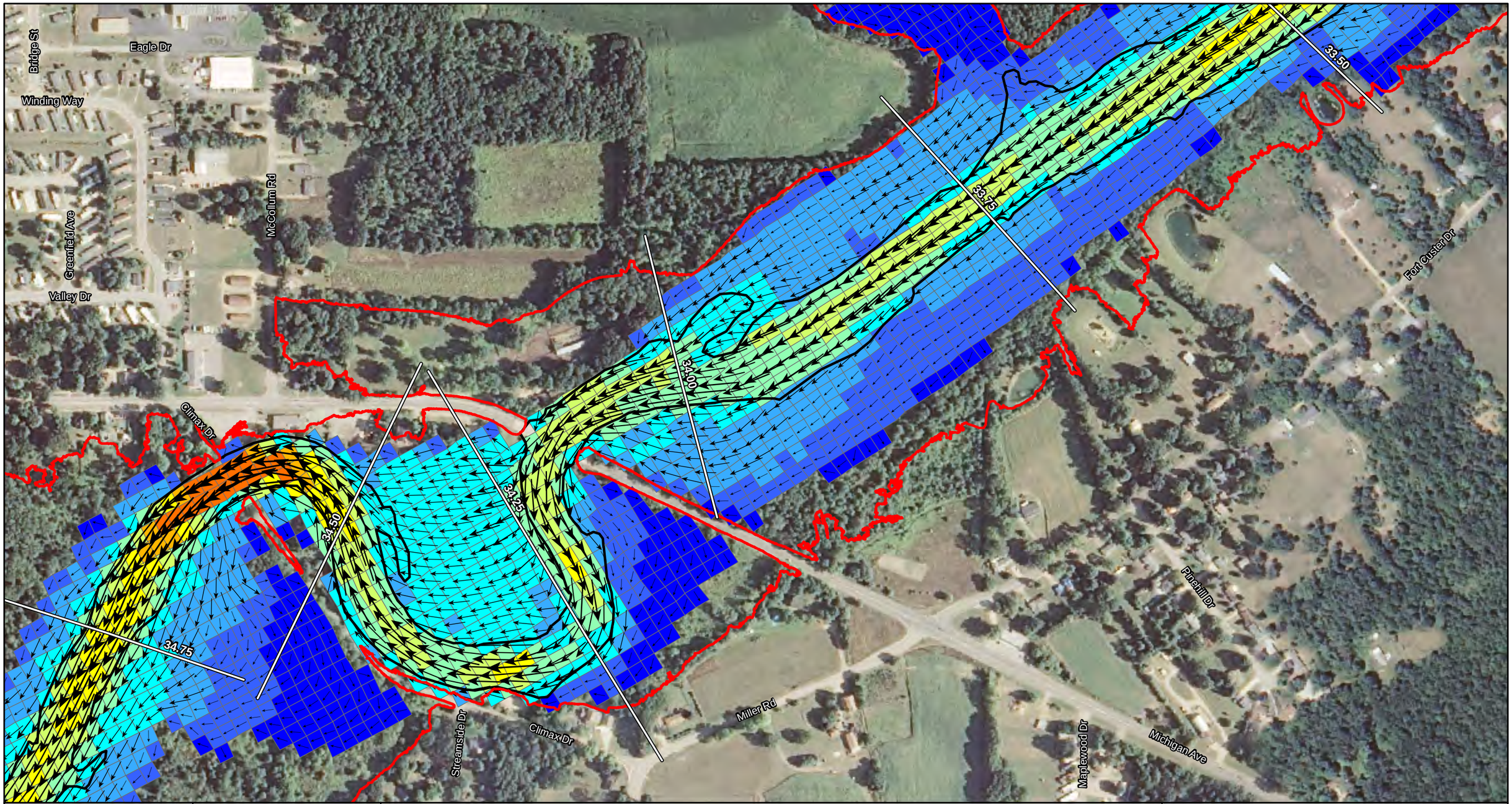
MP 31.40 - MP 31.94

SHEET 37 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May28_2011.mxd

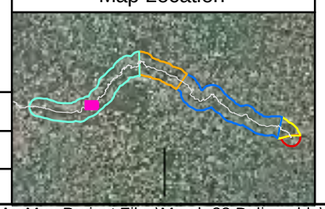
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

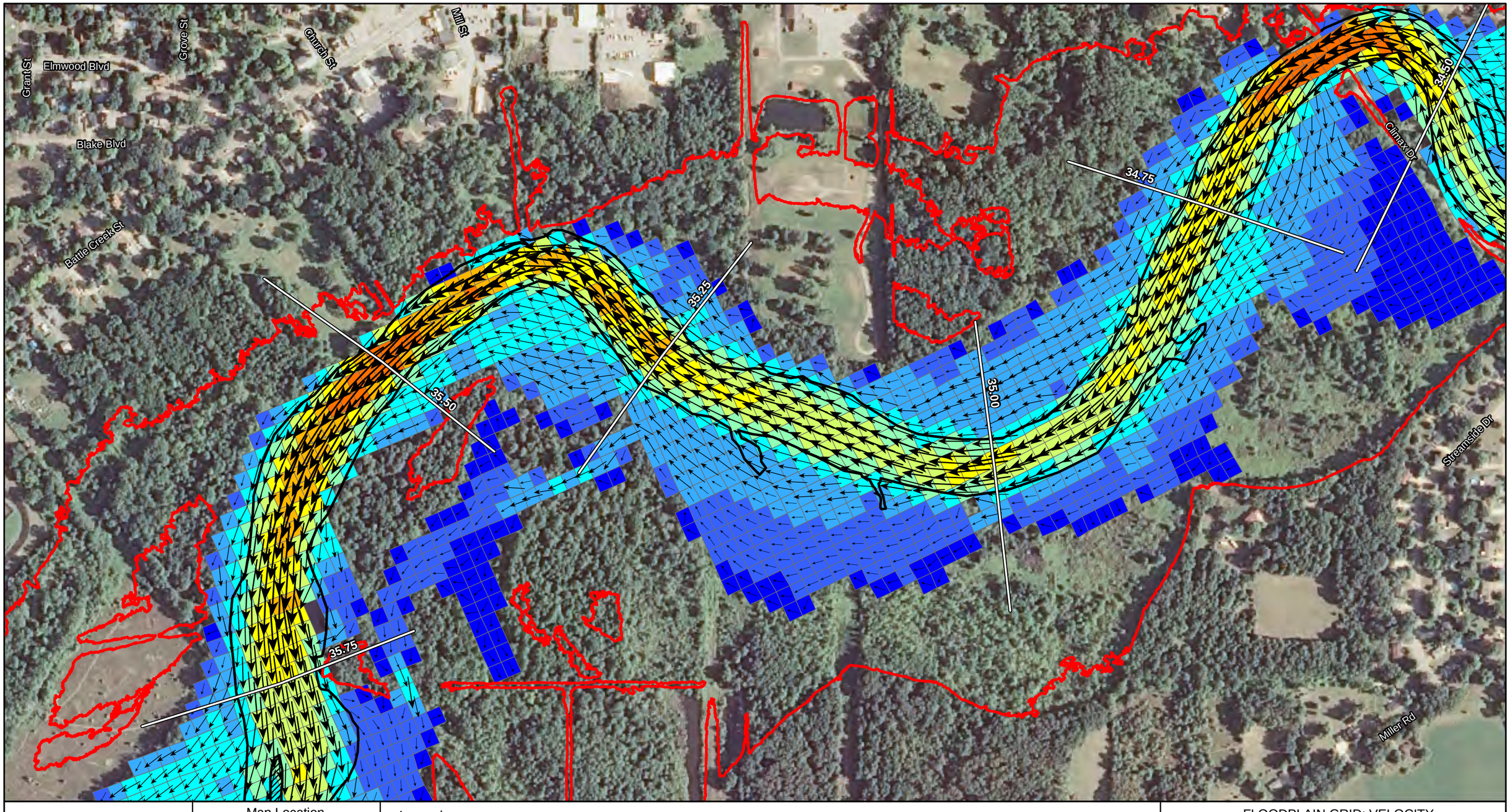
MP 33.52 - MP 34.70

SHEET 38 OF 45

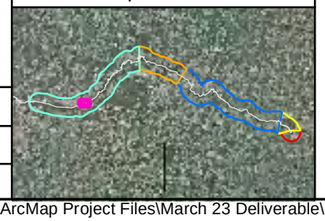
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May28_2011.mxd

Aerial Photography Date: July & August 2009



Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

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cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

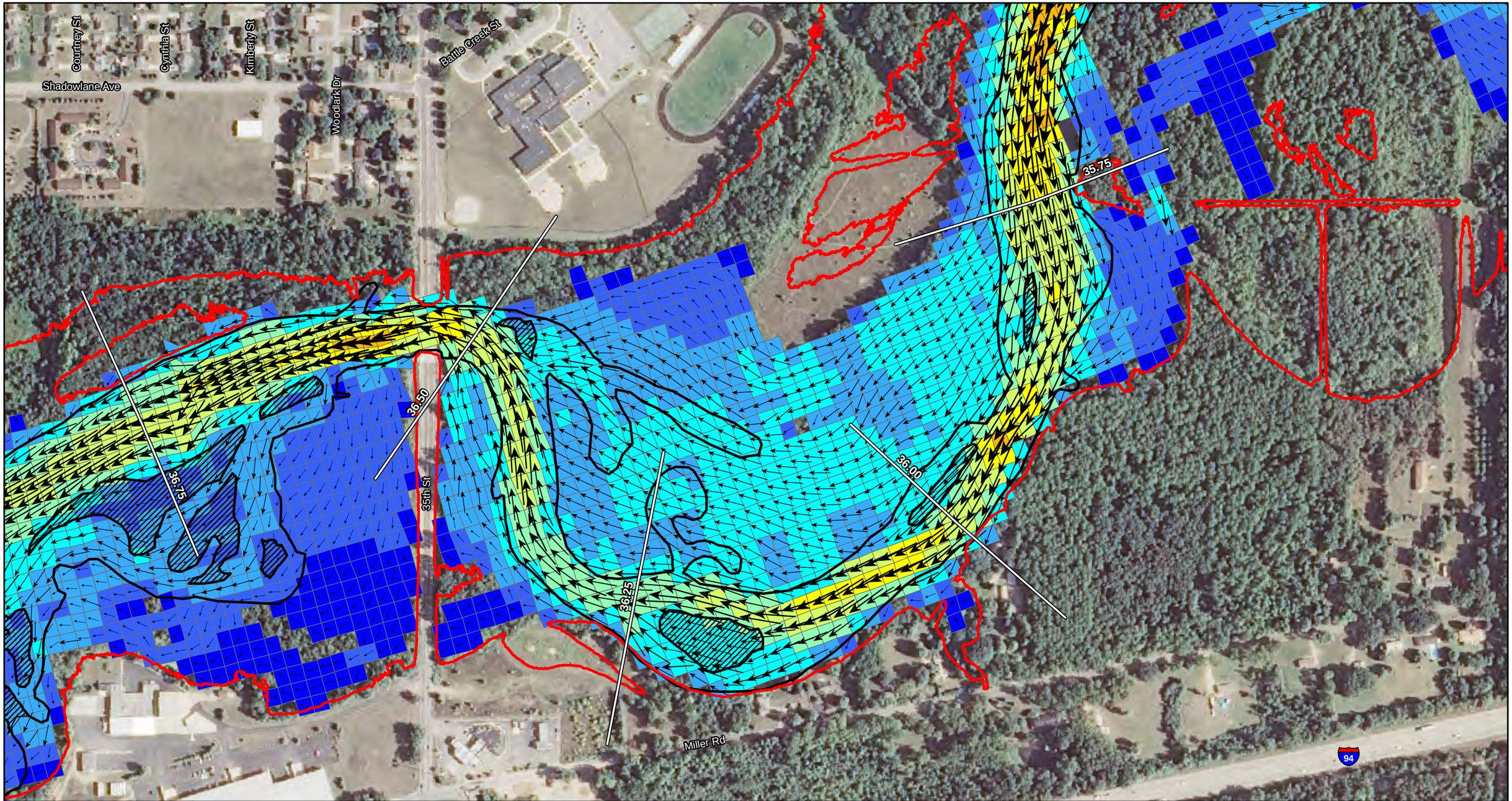
MP 34.70 - MP 35.75

SHEET 39 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
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ft/sec = Feet Per Second
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N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

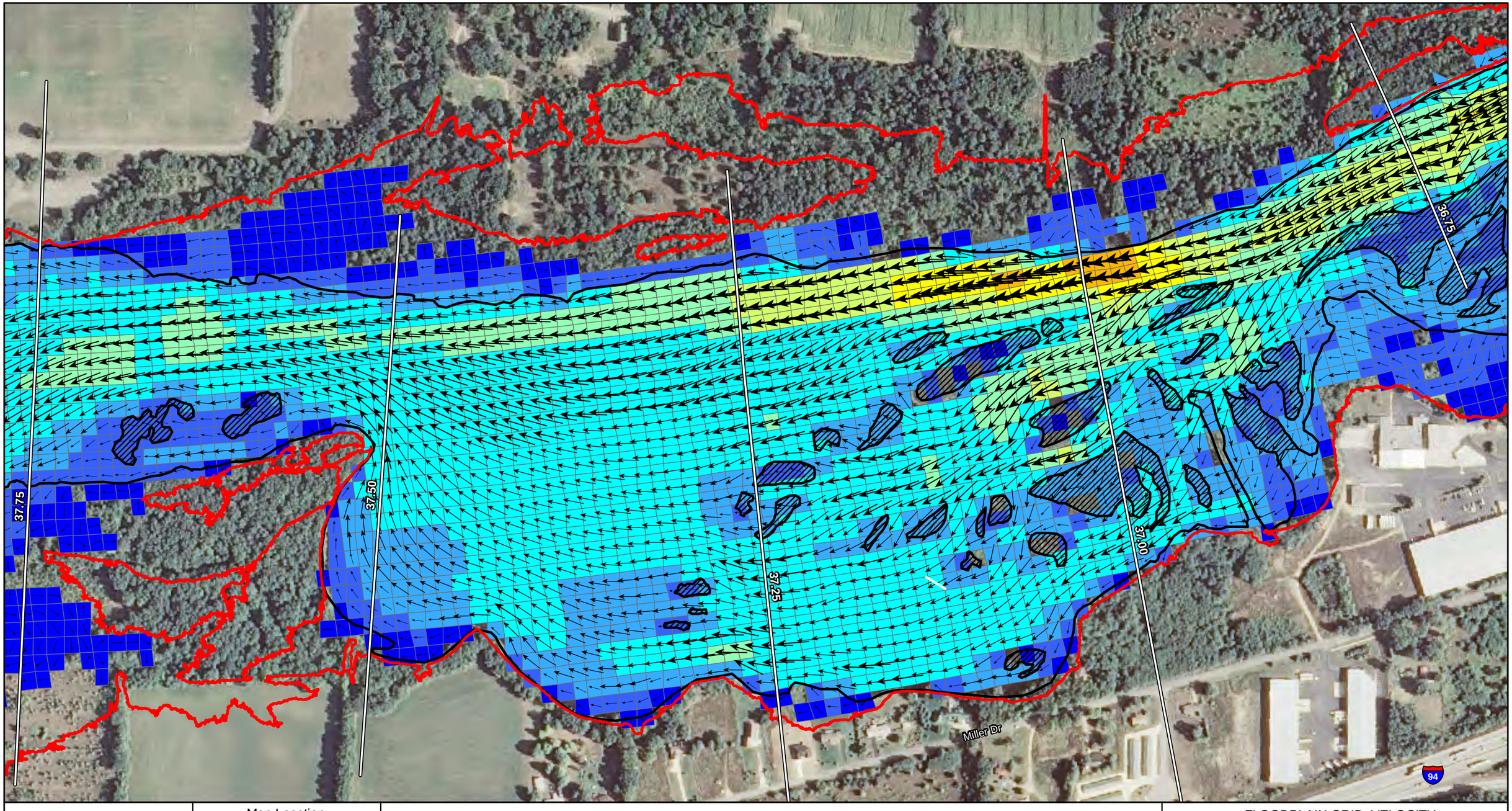
MP 35.75 - MP 36.75

SHEET 40 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
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ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

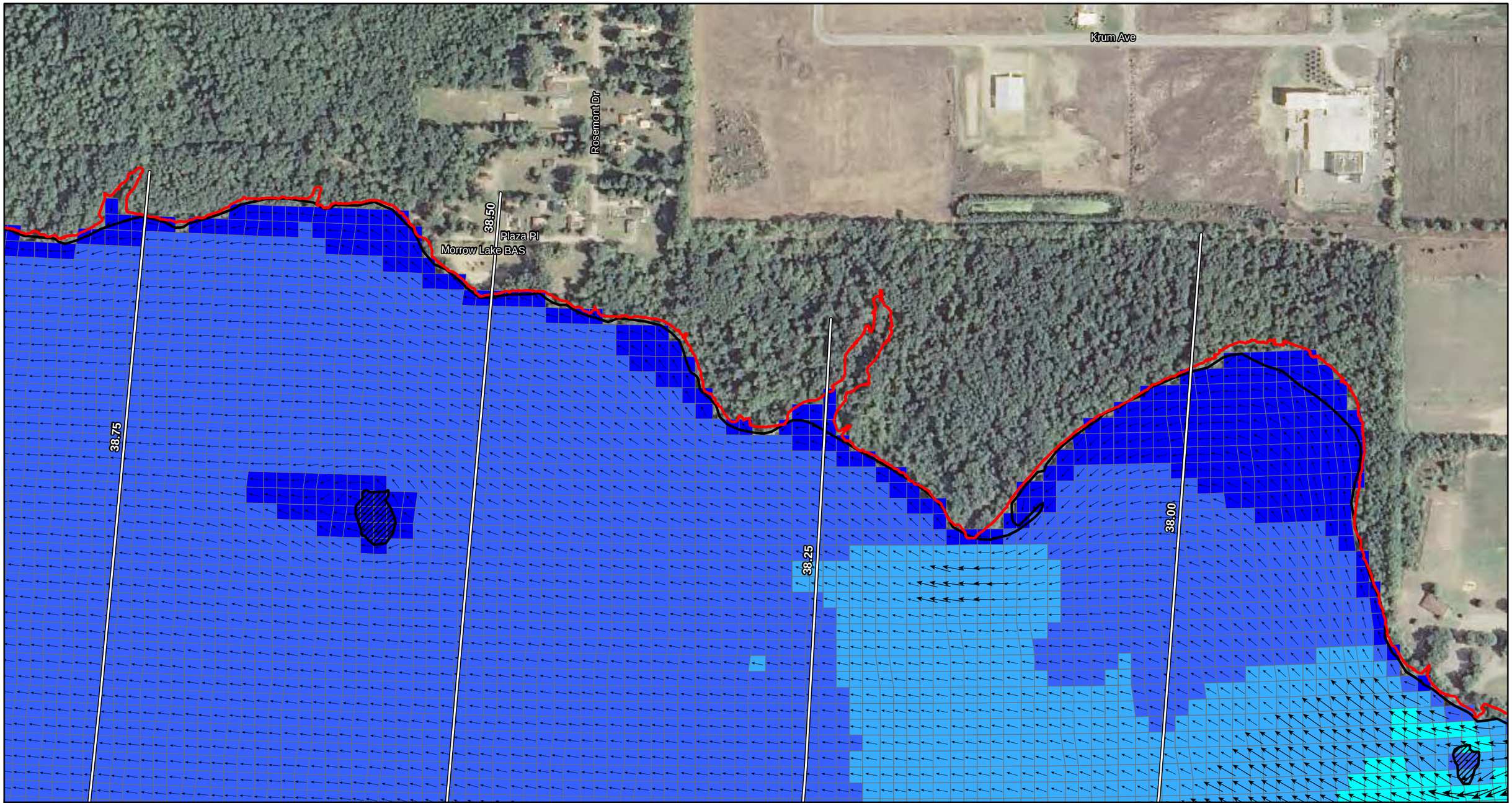
MP 36.75 - MP 37.75

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ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
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N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

MP 37.75N - MP 38.80N

SHEET 42 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May28_2011.mxd

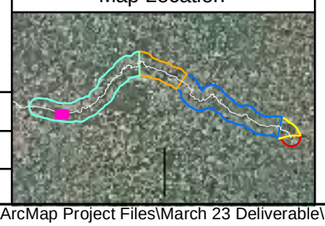
Aerial Photography Date: July & August 2009

38.75
38.50
38.25
38.00
37.75
94
Lyon Rd
Miller Dr

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
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ft/sec = Feet Per Second
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0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

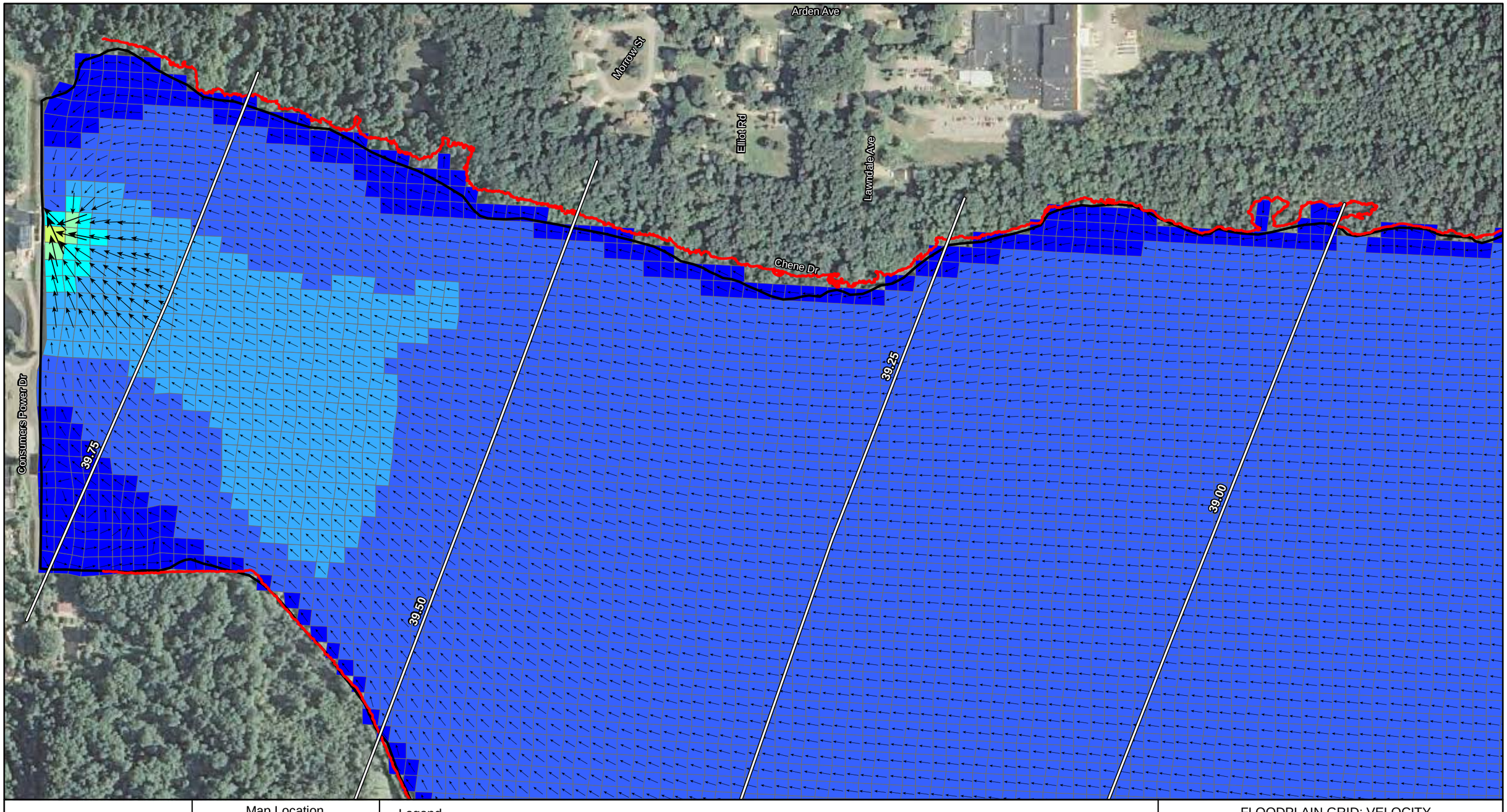
MP 37.75S - MP 38.80S

SHEET 43 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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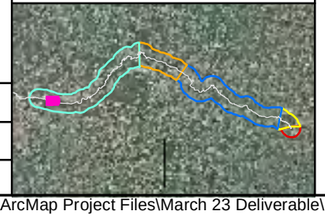
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
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0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

MP 37.75S - MP 38.80S

SHEET 44 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009

39.50

39.25

39.00

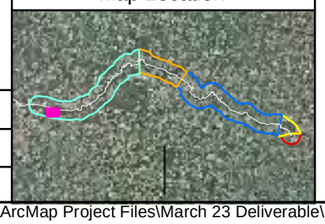
38.75

94

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
MAY 28, 2011

MP 38.80S - MP 39.95S

SHEET 45 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_May28_2011.mxd

Aerial Photography Date: July & August 2009

Figure 5-17

Floodplain Grid: Velocity

June 3, 2011

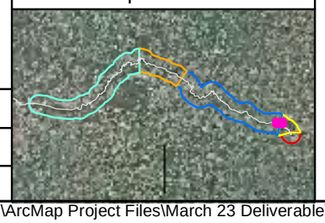
Sheets 1 through 45

2.50
2.75
2.25
2.00
Friendship Ln
Peter Pan Ln
Squaw Creek Rd
Brook Dr
River Park Dr
15 Mile Rd
A Dr N
15 1/2 Mile Rd

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

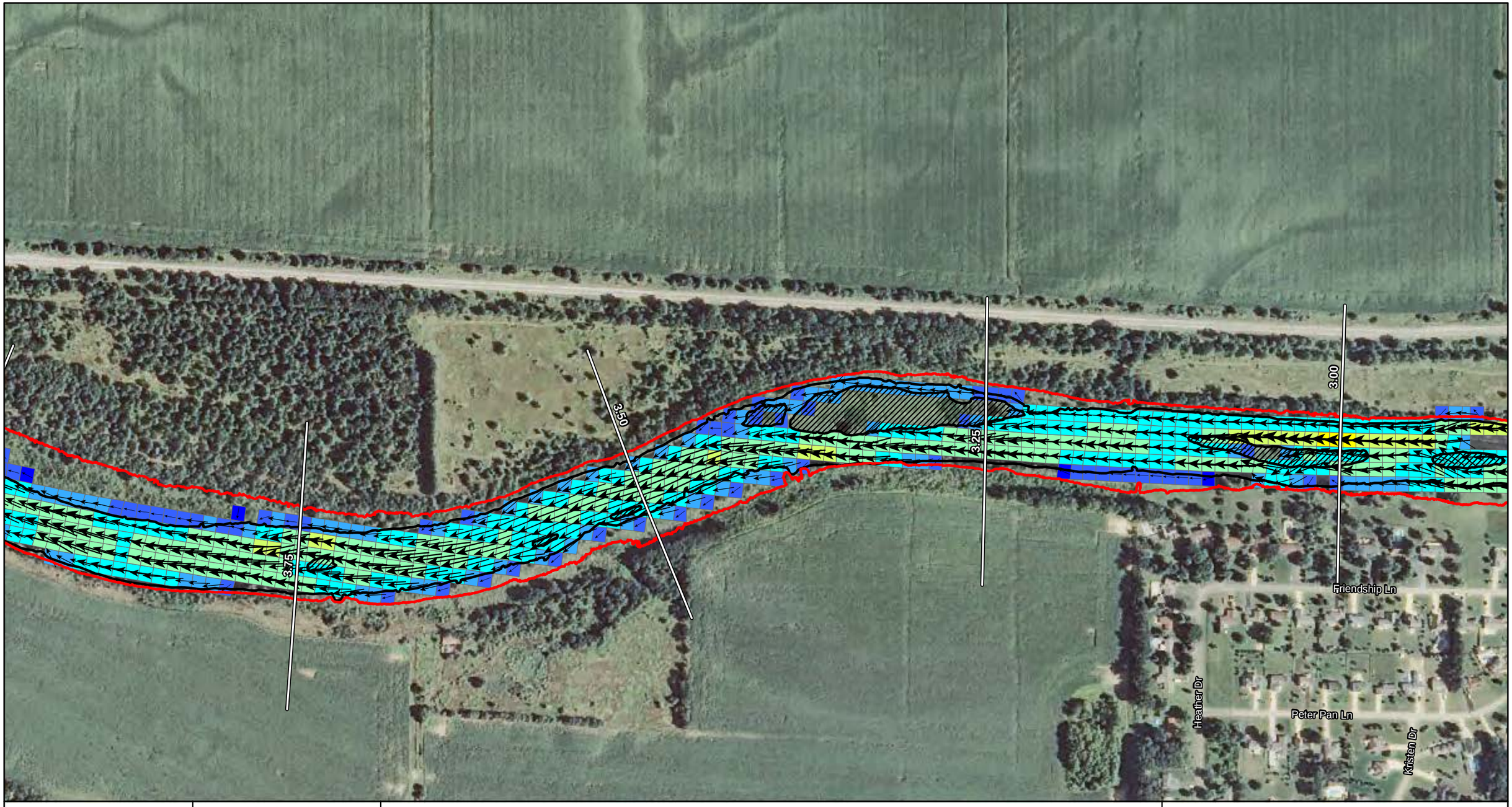
MP 01.88 - MP 02.91

SHEET 1 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

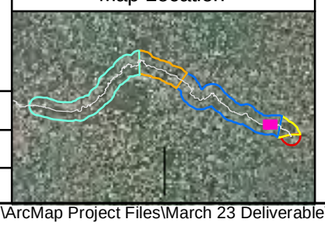
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

MP 02.91 - MP 03.93

SHEET 2 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

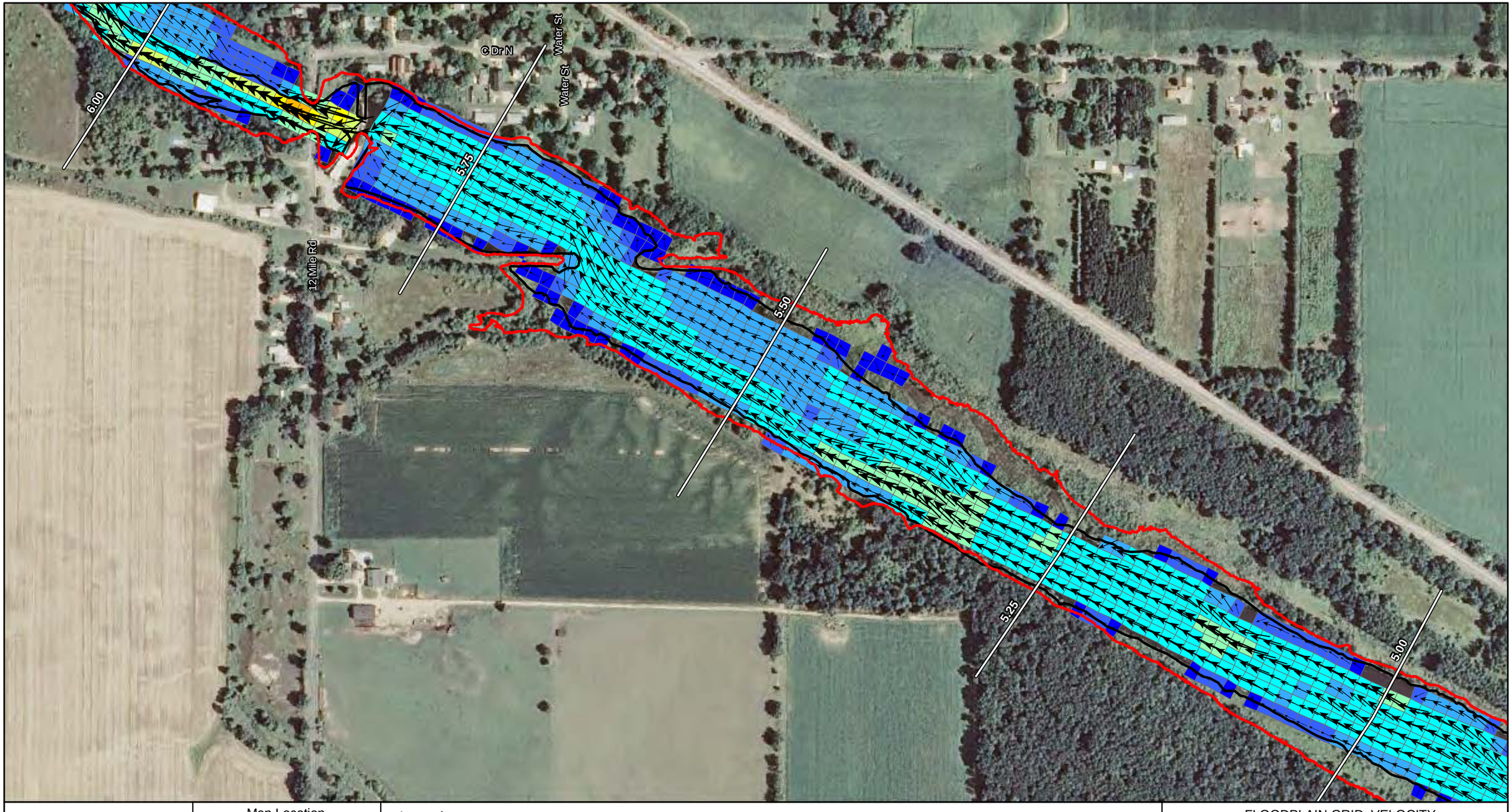
MP 02.91 - MP 03.93

SHEET 3 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

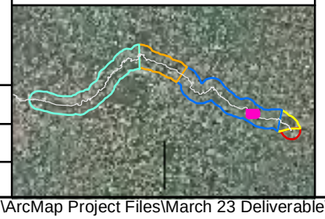
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

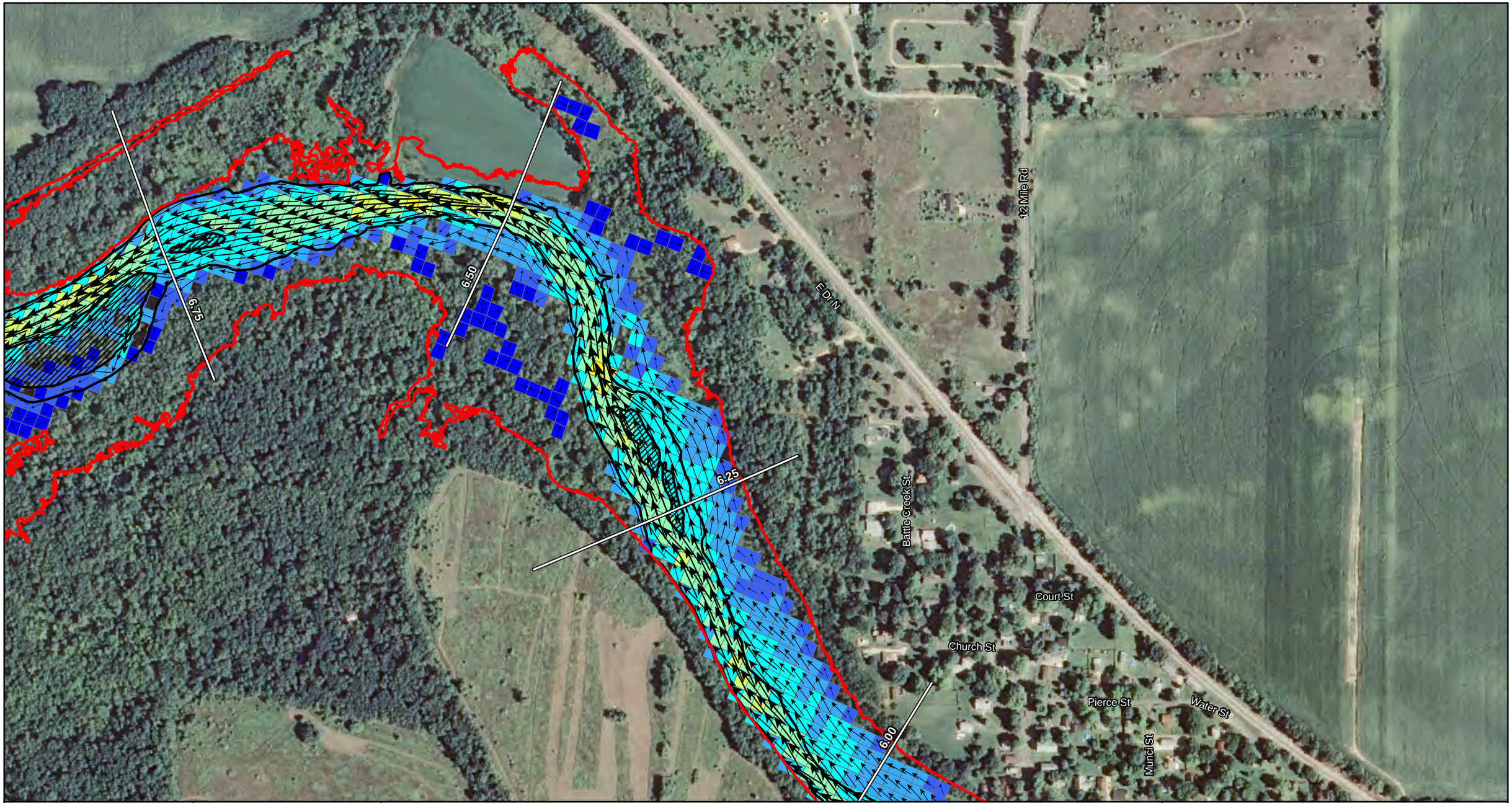
MP 04.98 - MP 06.03

SHEET 4 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

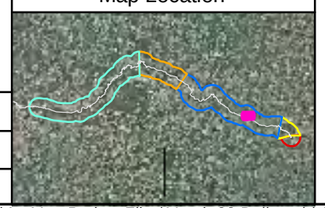
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

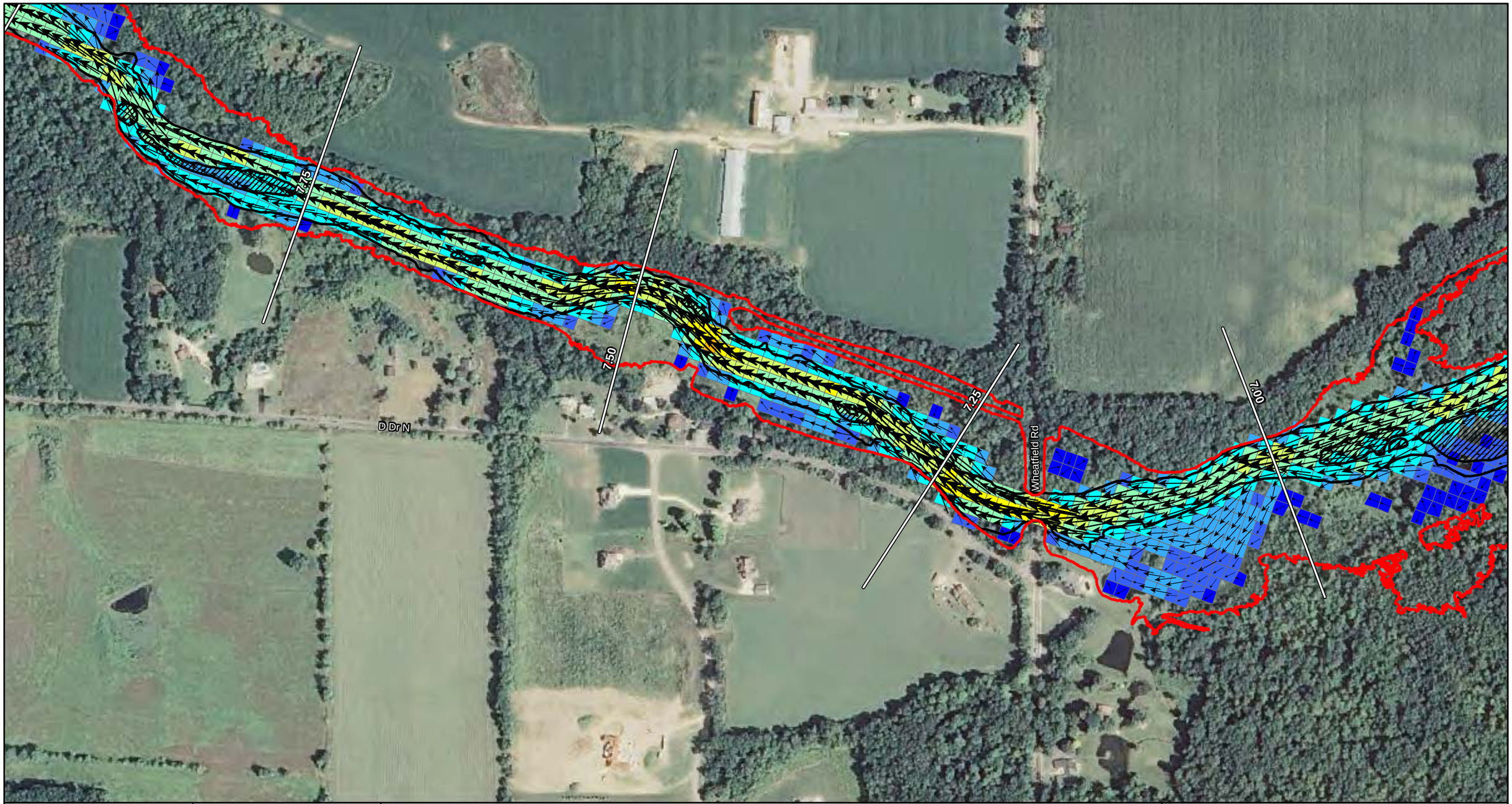
MP 06.03 - MP 06.85

SHEET 5 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

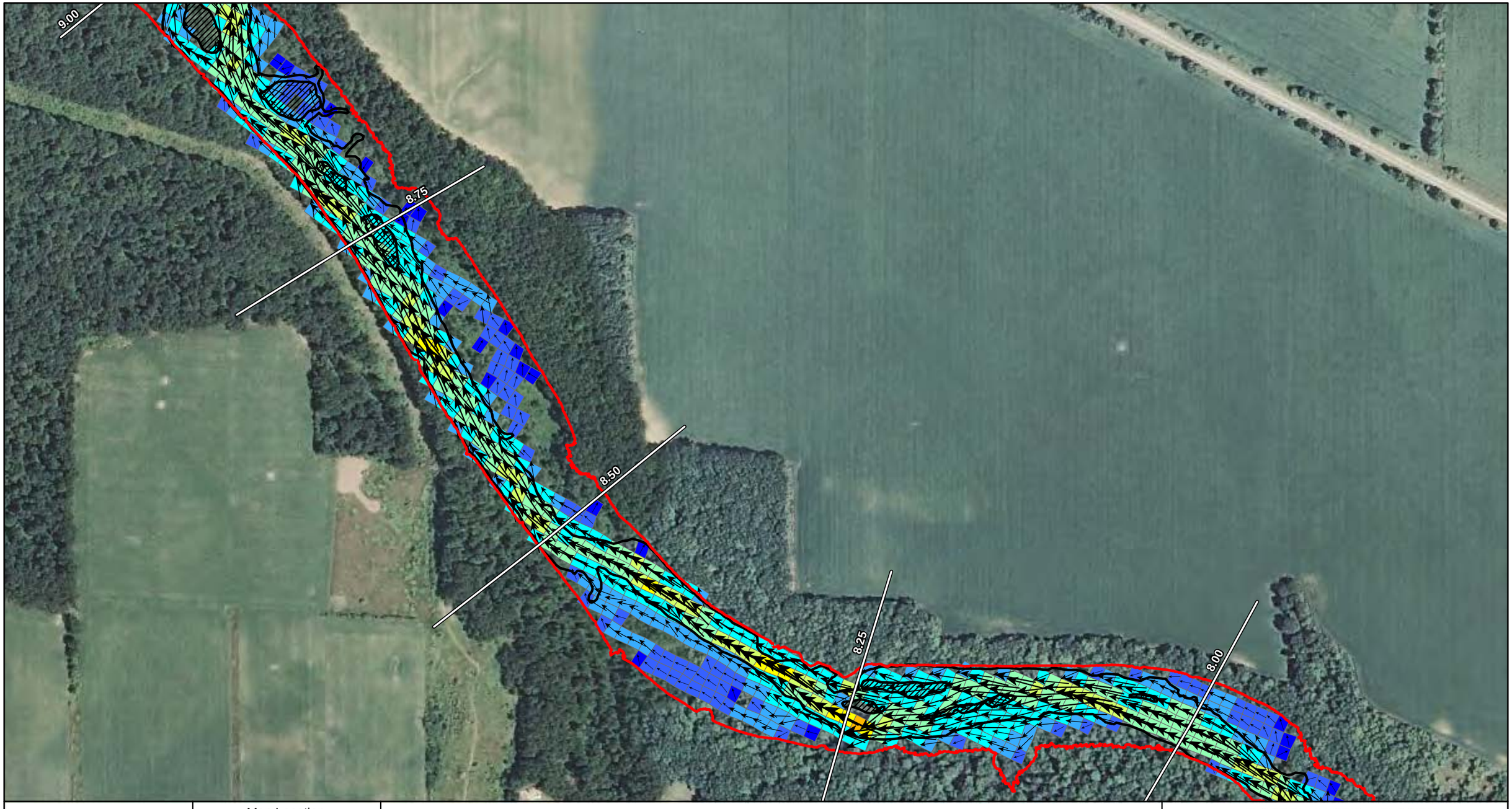
MP 06.85 - MP 07.95

SHEET 6 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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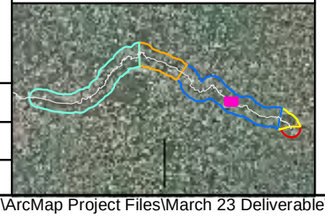
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

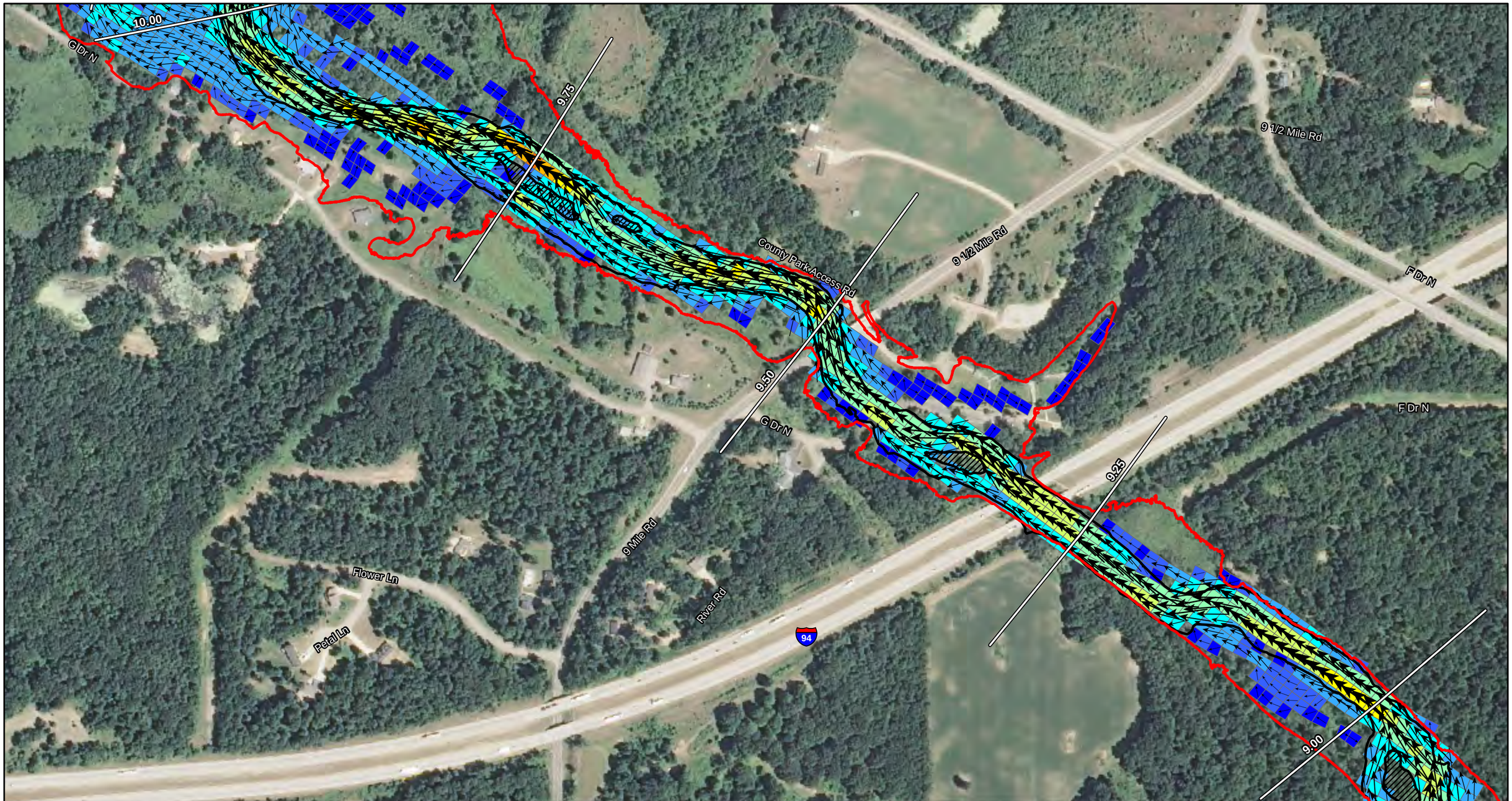
MP 07.95 - MP 08.93

SHEET 7 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

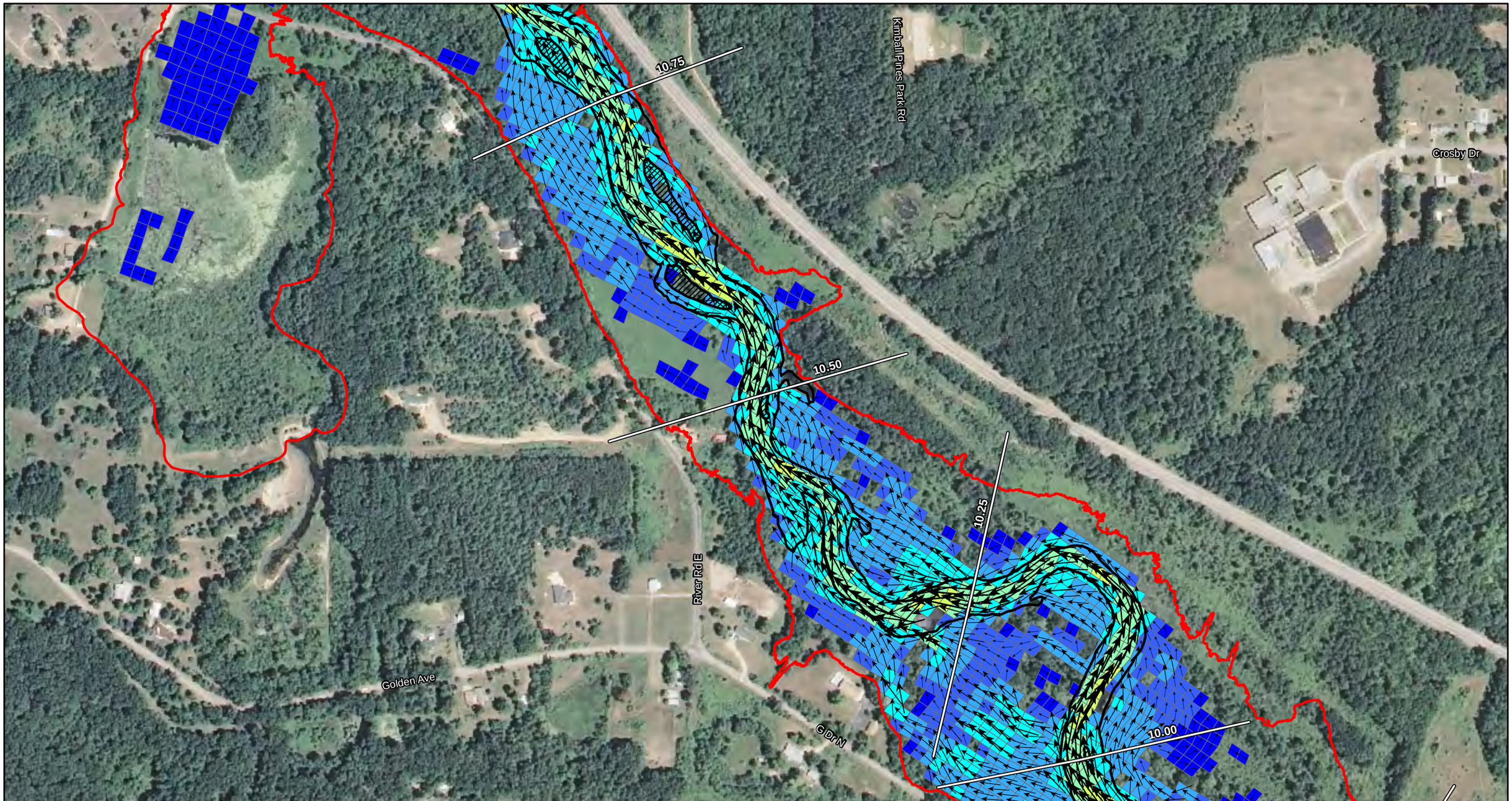
MP 08.93 - MP 10.00

SHEET 8 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

MP 10.00 - MP 10.80

SHEET 9 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

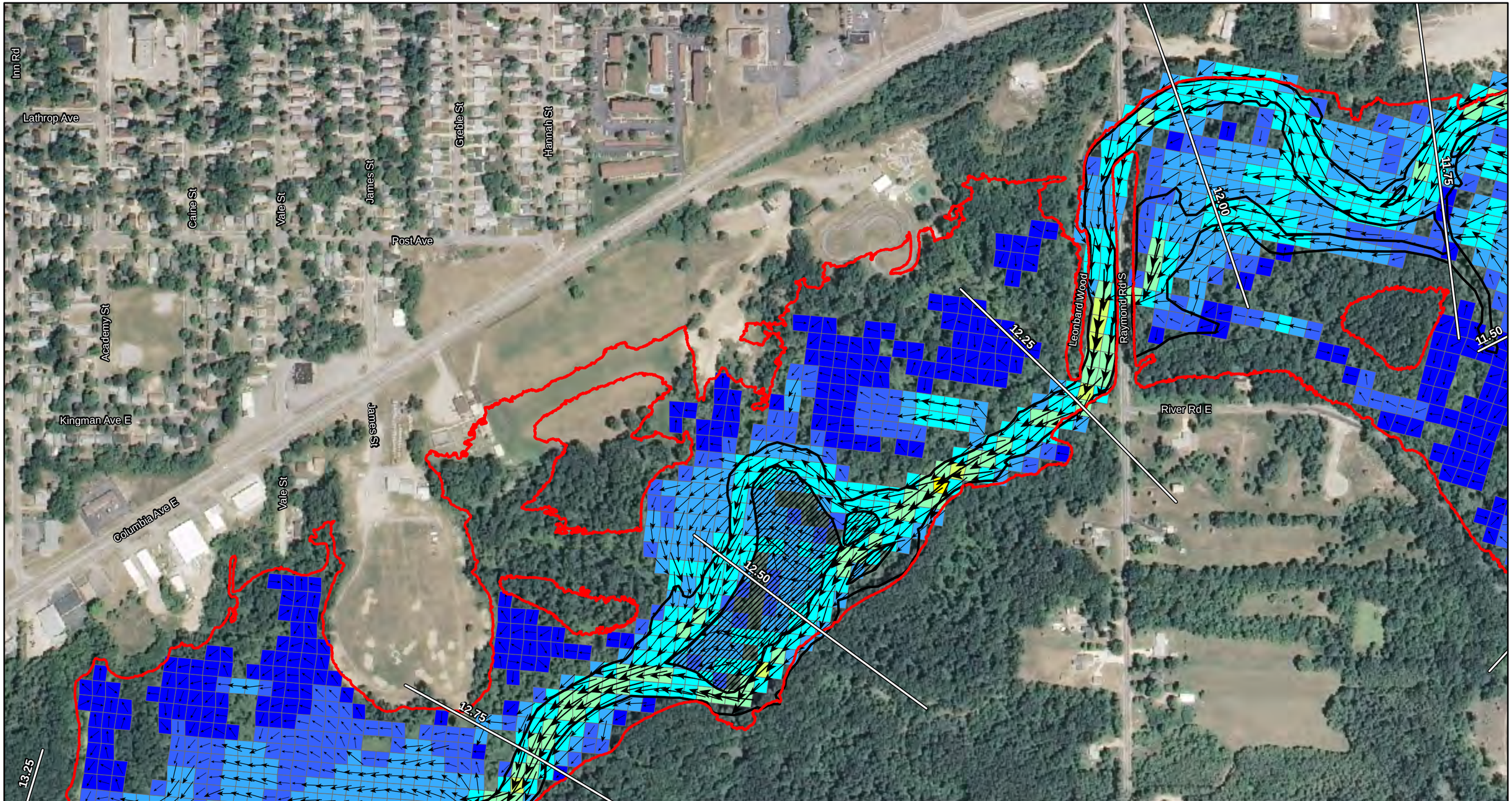
MP 10.80 - MP 11.70

SHEET 10 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
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- Island Bankline
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- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

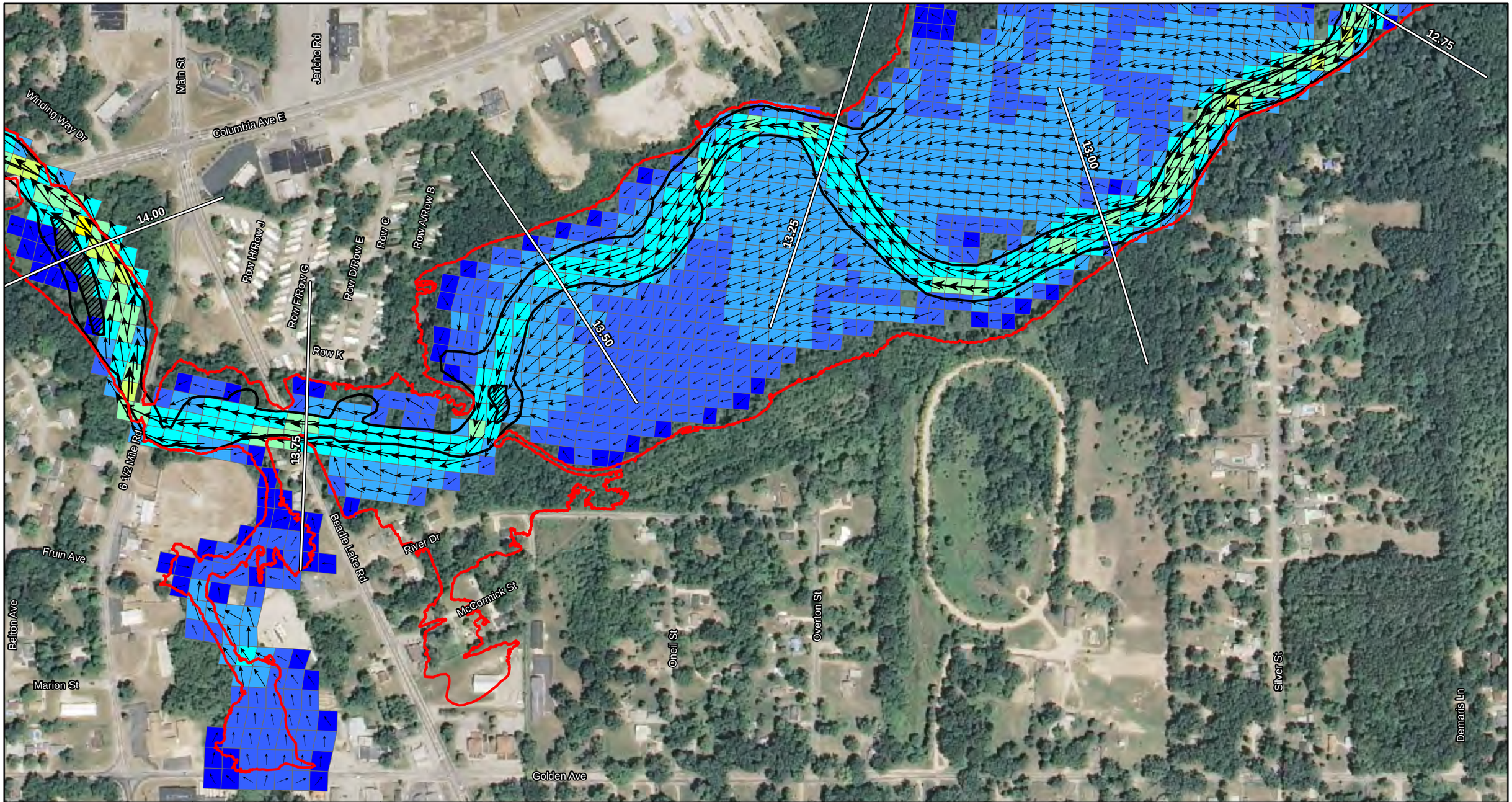
MP 11.70 - MP 12.77

SHEET 11 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

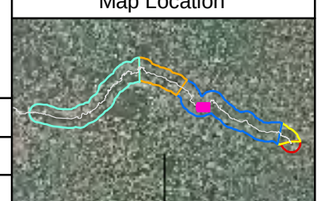
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
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- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

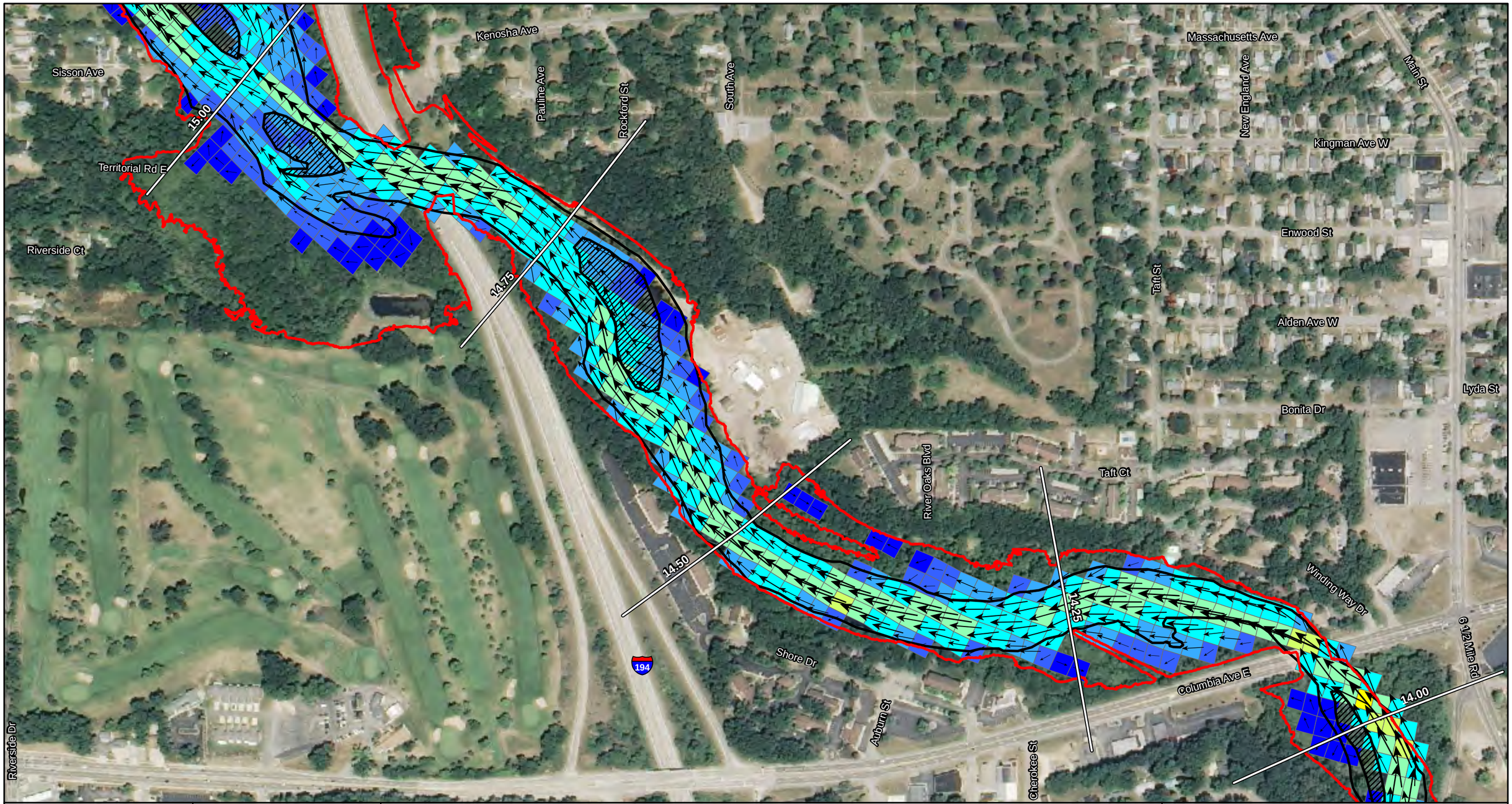
MP 12.77 - MP 14.00

SHEET 12 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

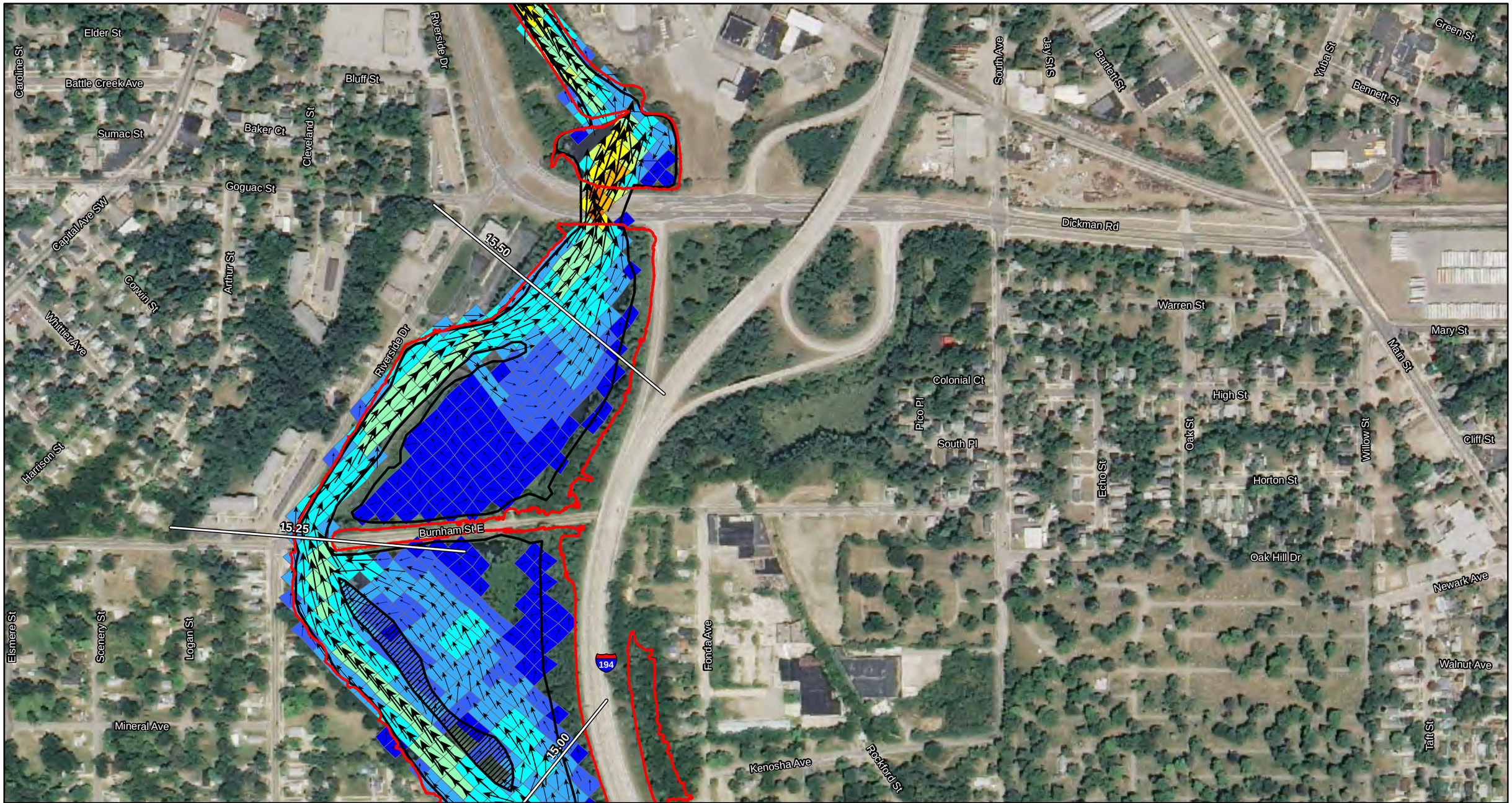
MP 14.00 - MP 15.05

SHEET 13 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

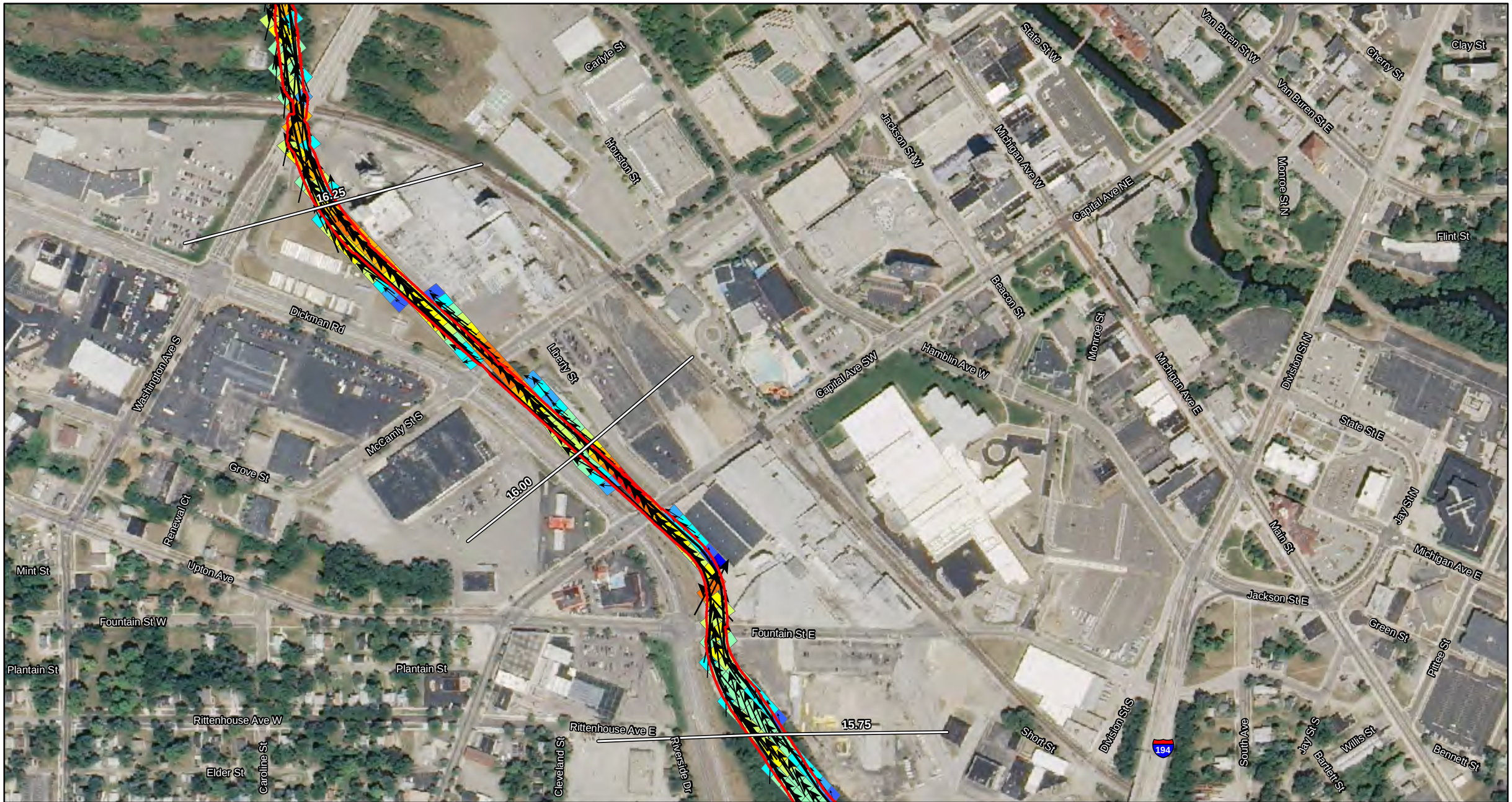
MP 15.05 - MP 15.71

SHEET 14 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

Aerial Photography Date: July & August 2009



ENBRIDGE	
Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
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- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

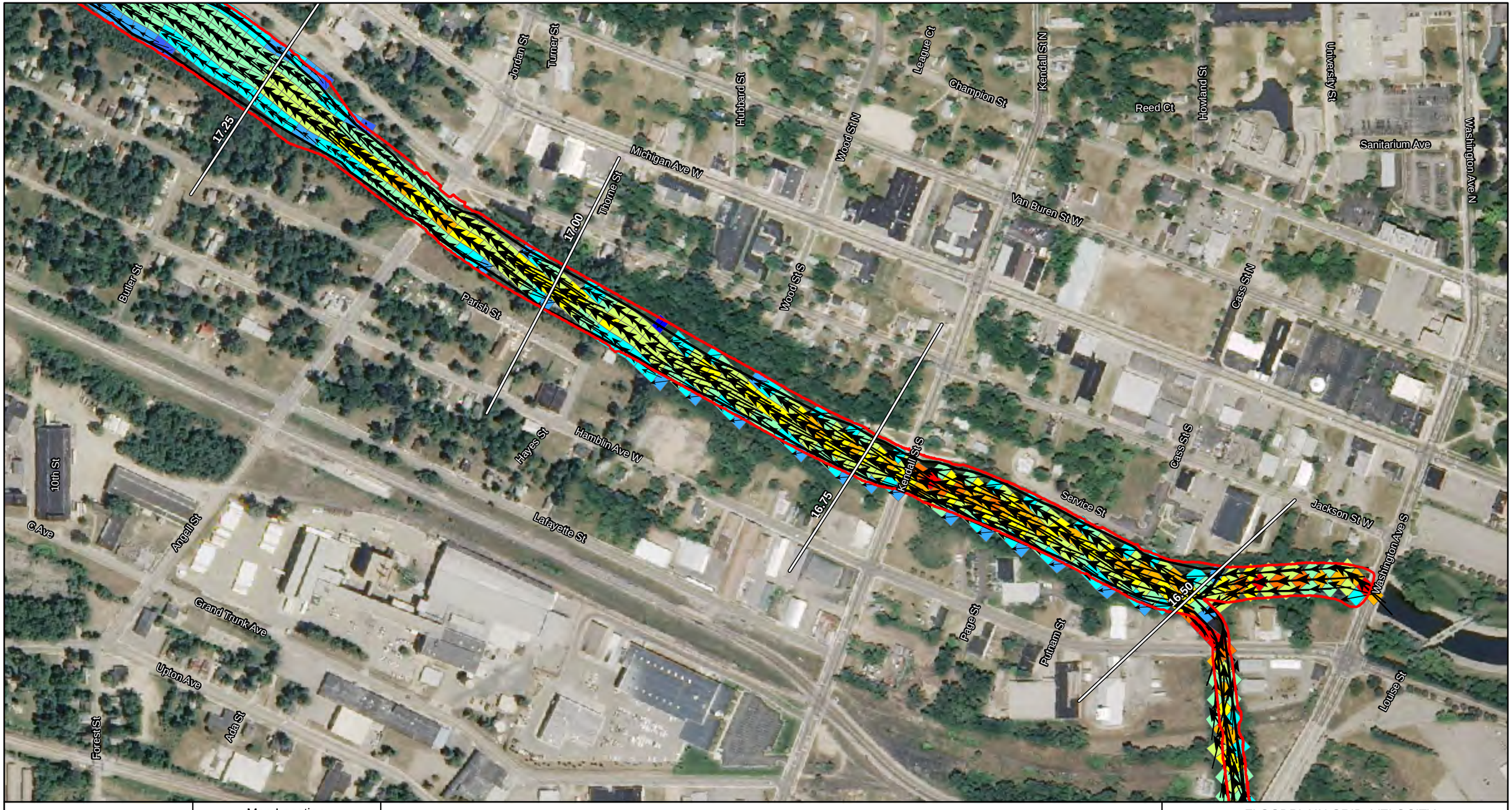
MP 15.71 - MP 16.38

SHEET 15 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

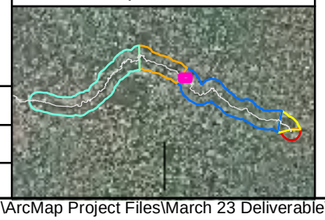
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
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- Channel Bankline
- Island Bankline
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

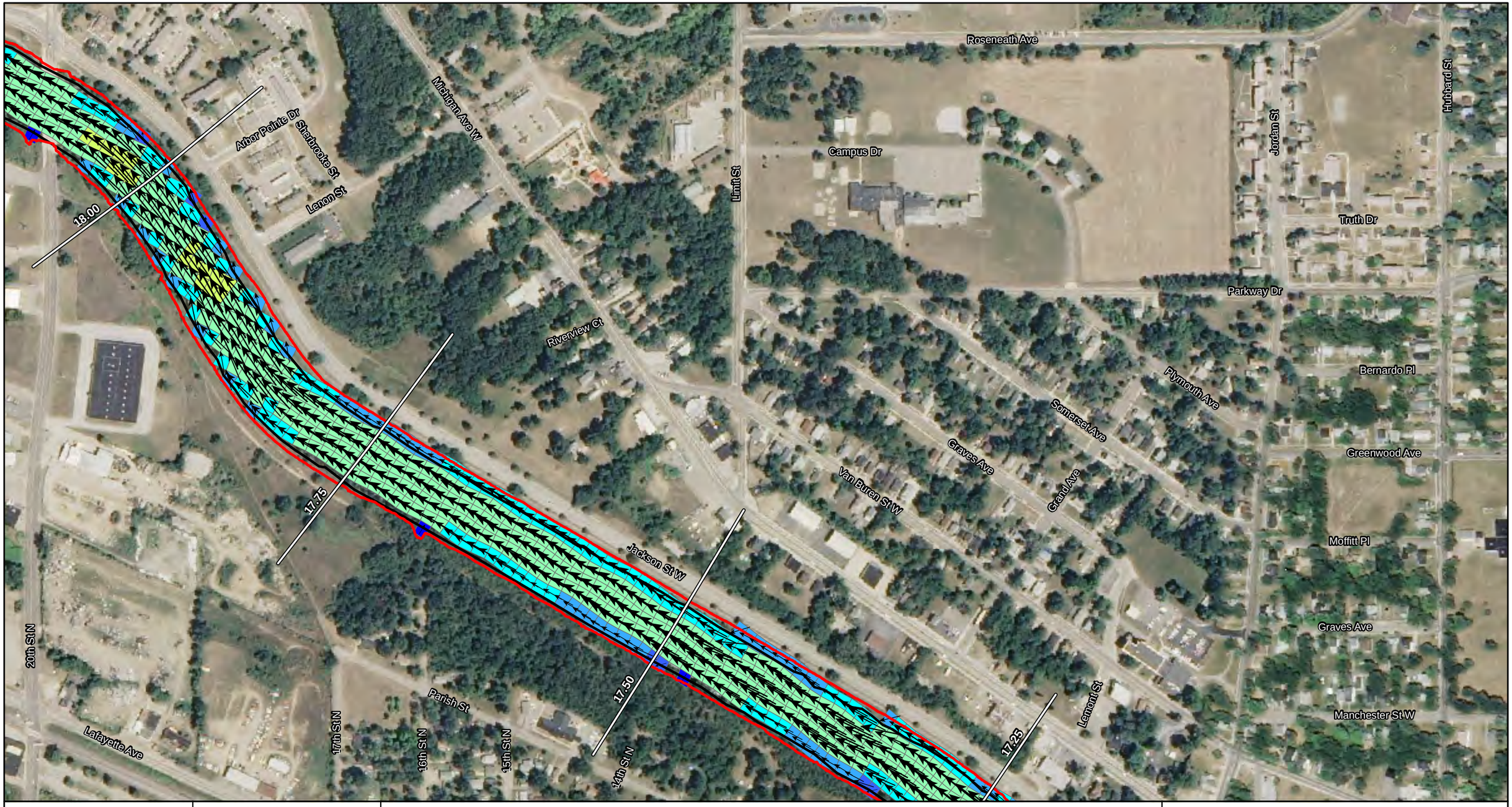
MP 16.38 - MP 17.30

SHEET 16 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

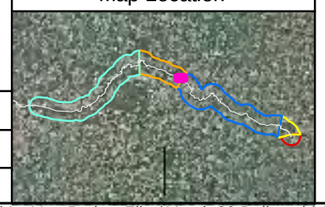
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

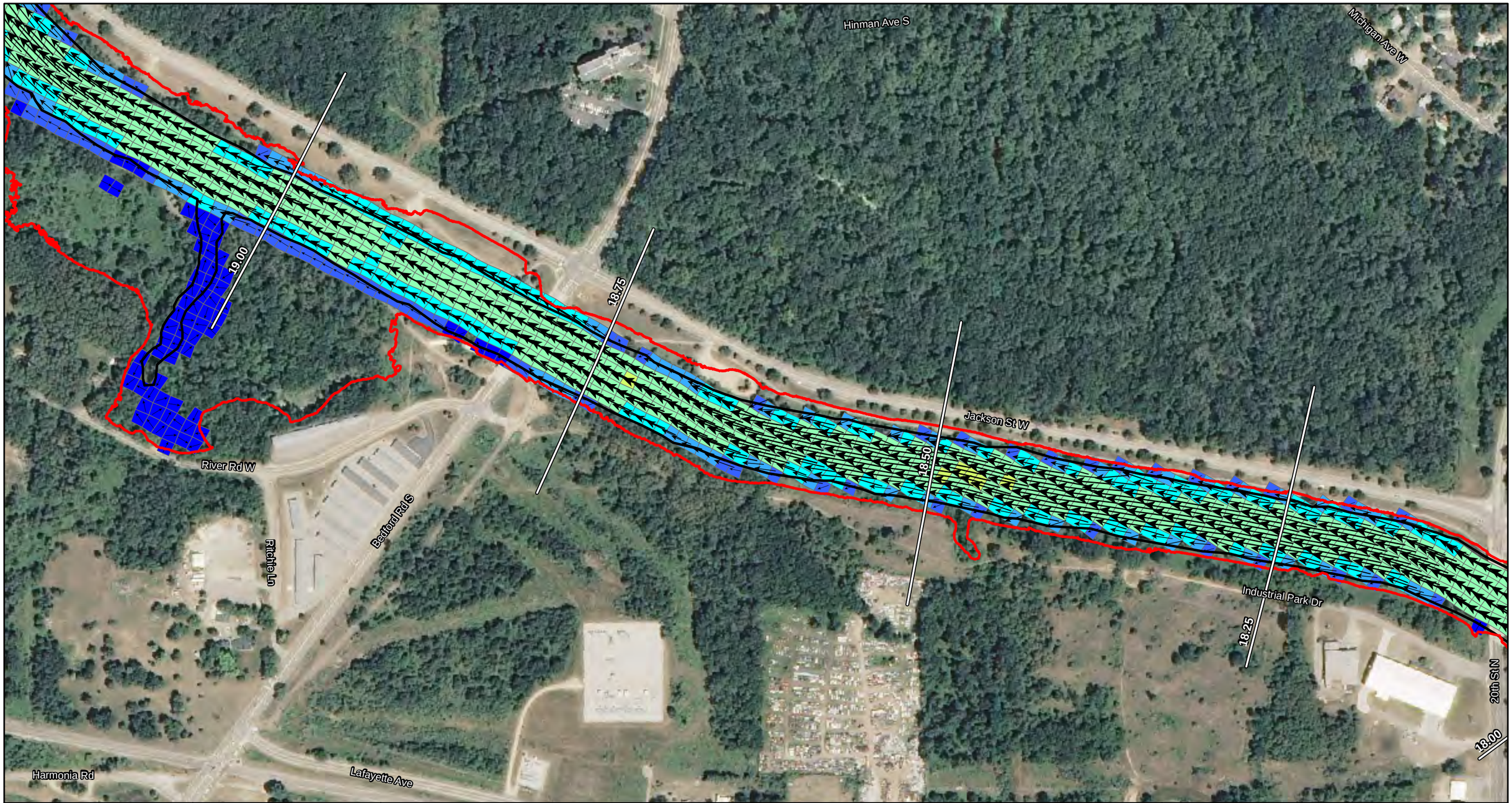
MP 17.30 - MP 18.11

SHEET 17 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
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ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

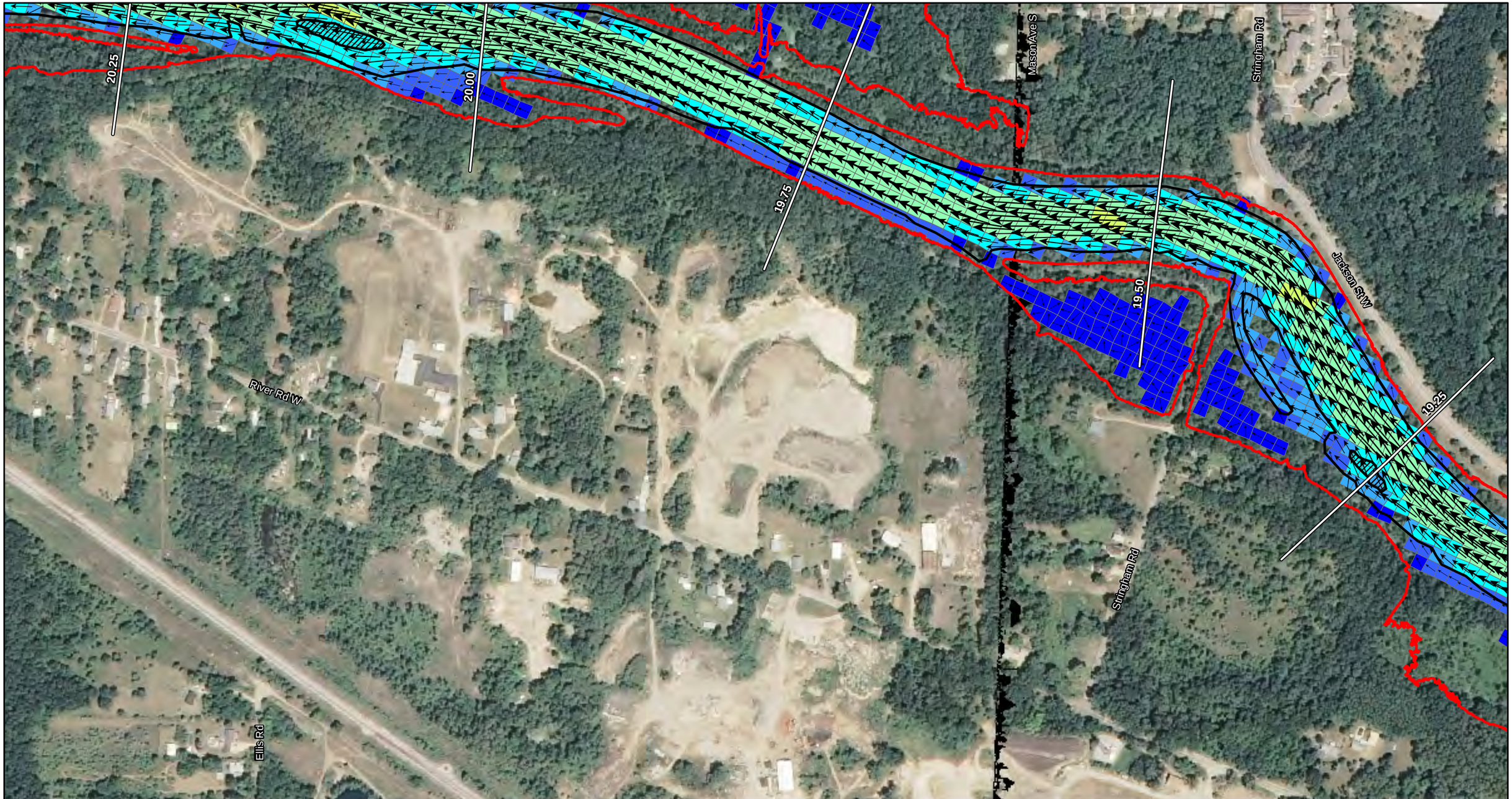
MP 18.11 - MP 19.18

SHEET 18 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

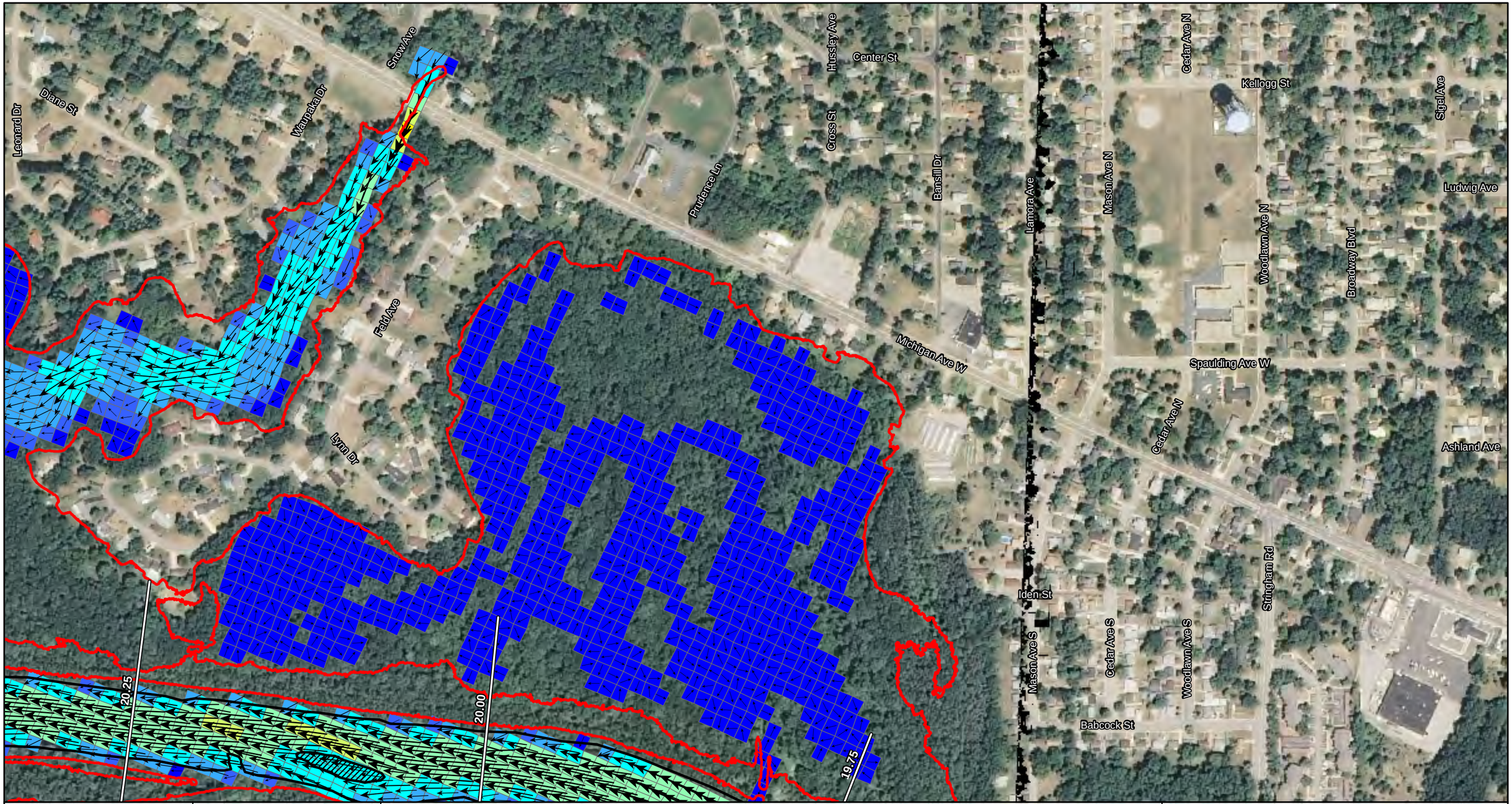
MP 19.18 - MP 20.00

SHEET 19 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

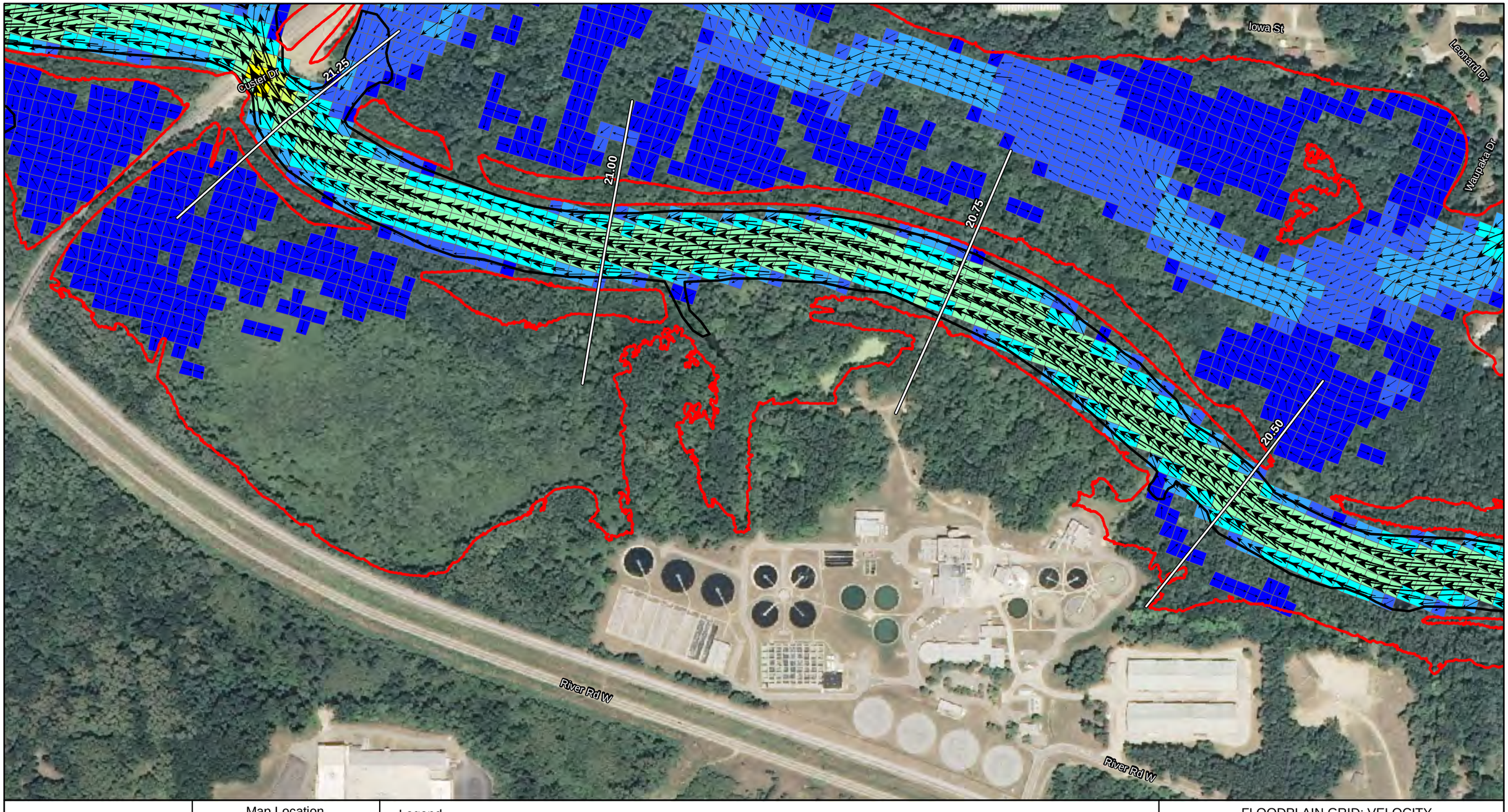
MP 20.00 - MP 20.32

SHEET 20 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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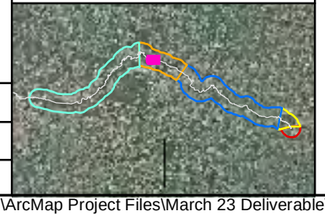
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

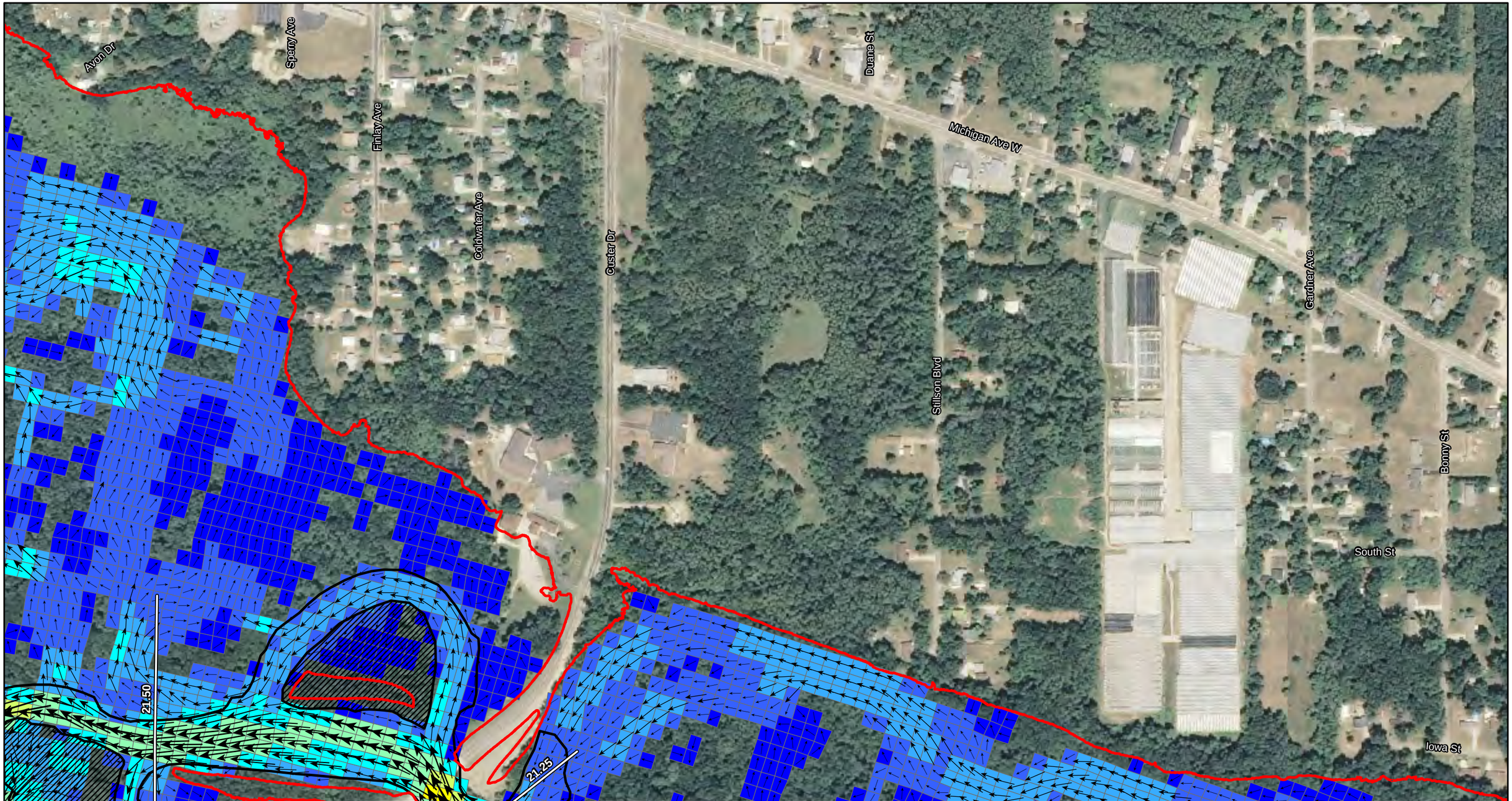
MP 20.32 - MP 21.36

SHEET 21 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

Aerial Photography Date: July & August 2009



Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

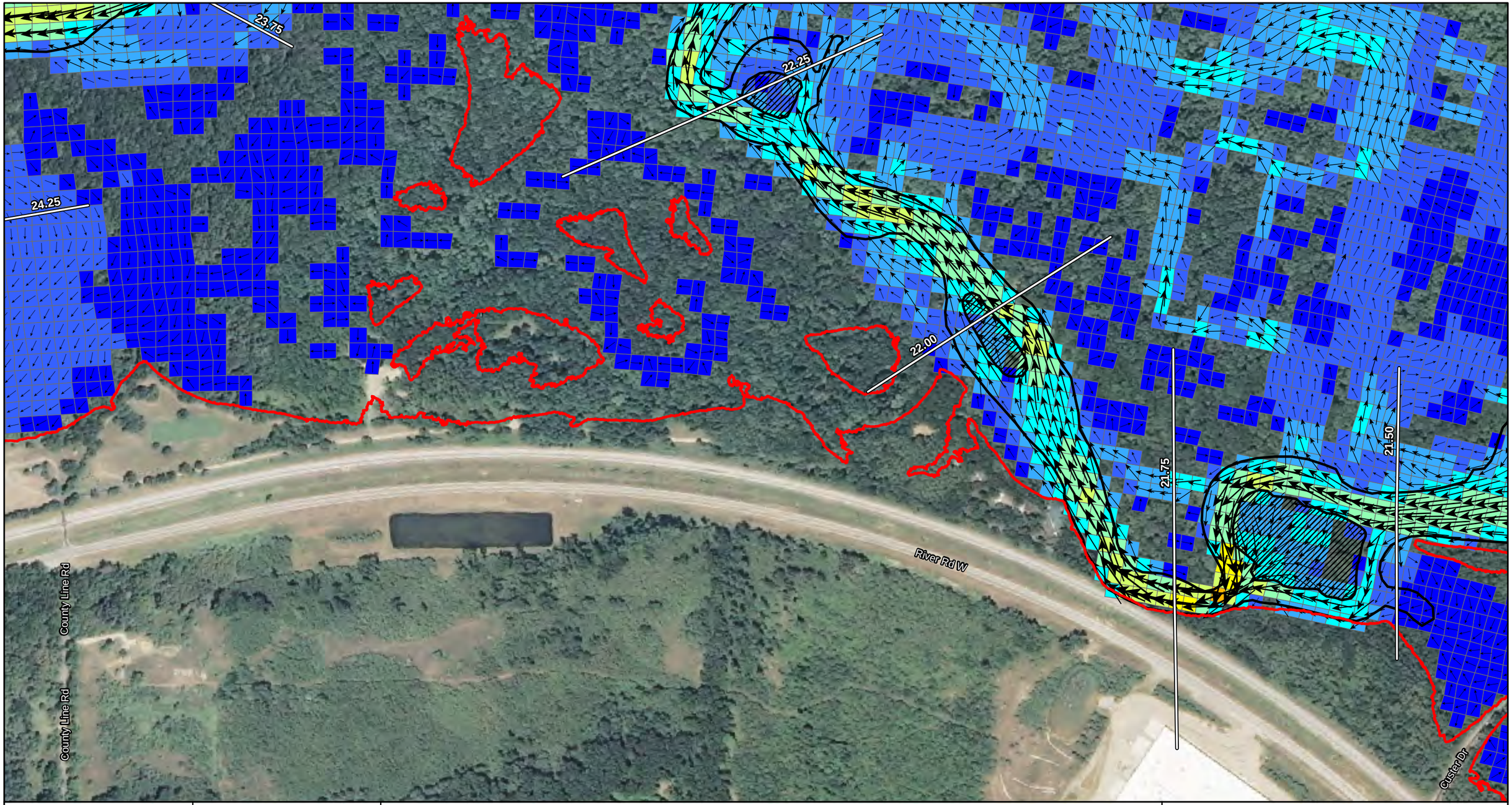
MP 21.36 - MP 21.59

SHEET 22 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

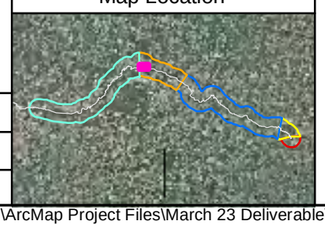
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

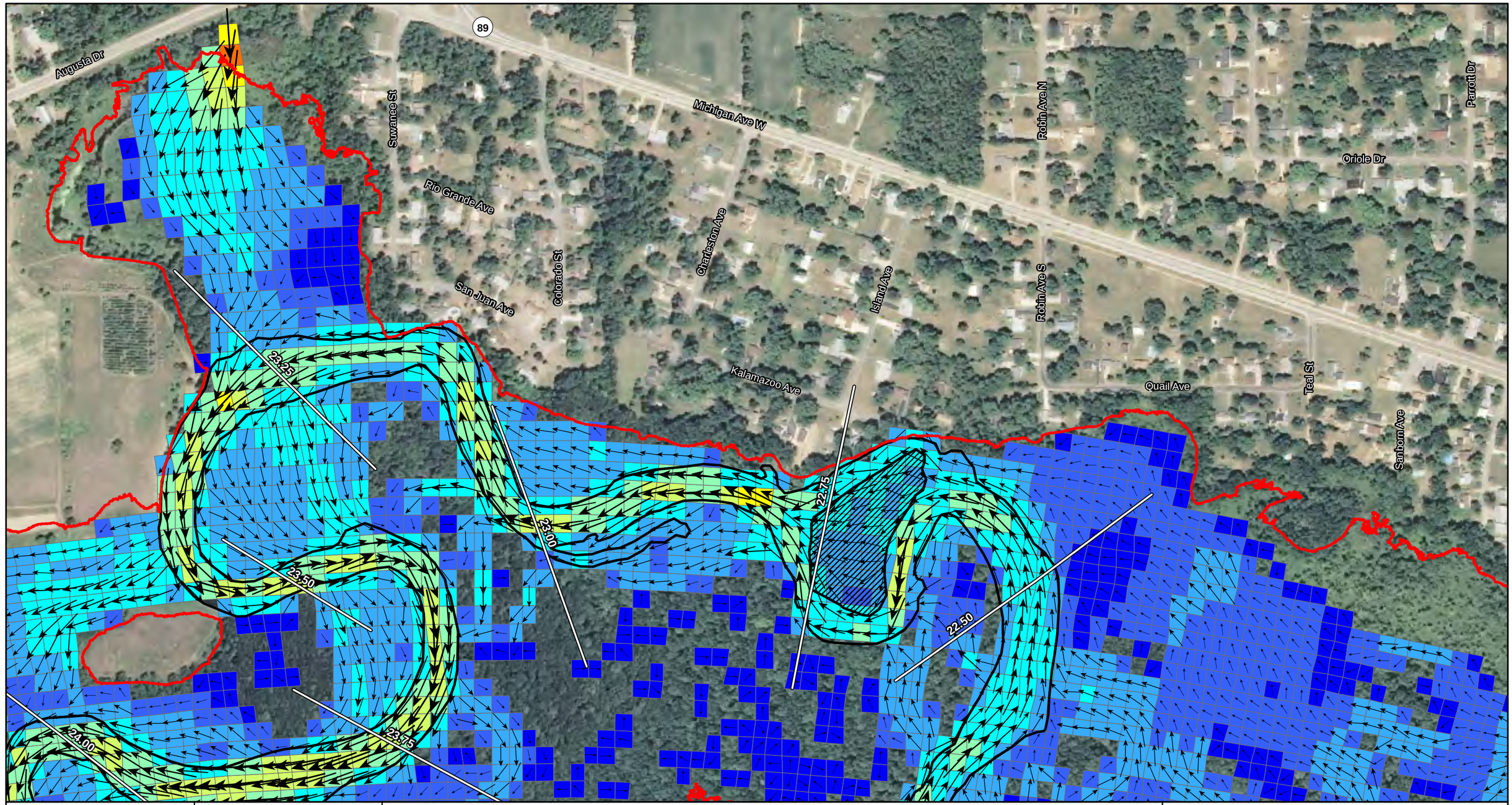
MP 21.59 - MP 22.33

SHEET 23 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

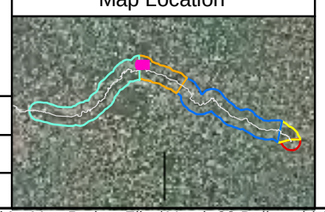
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
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- 2.0 - 2.5 ft/sec
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- 3.0 - 4.0 ft/sec
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- Flow Direction and Relative Magnitude
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

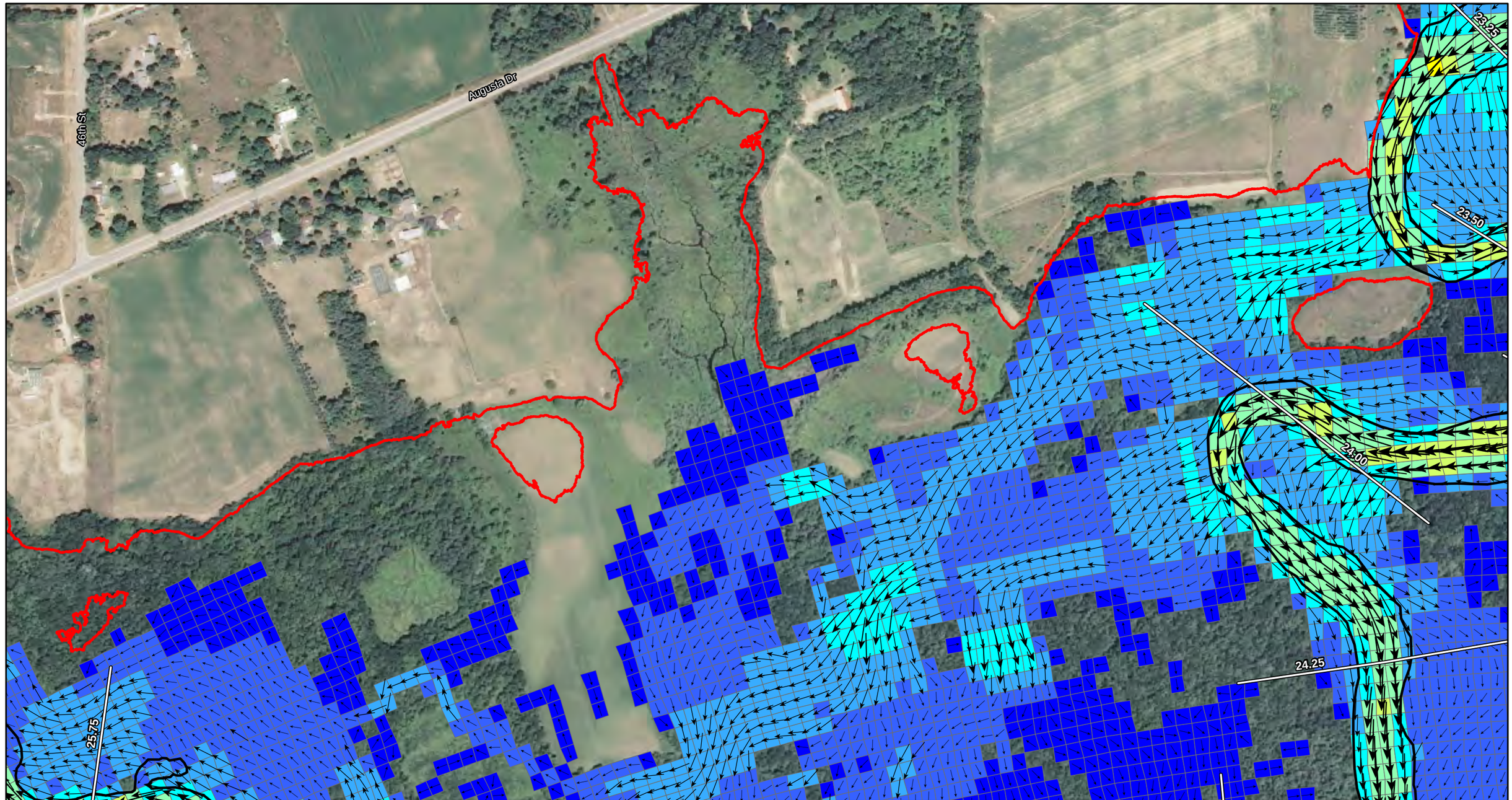
MP 22.33 - MP 24.01

SHEET 24 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
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- Flow Direction and Relative Magnitude
- Channel Bankline
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

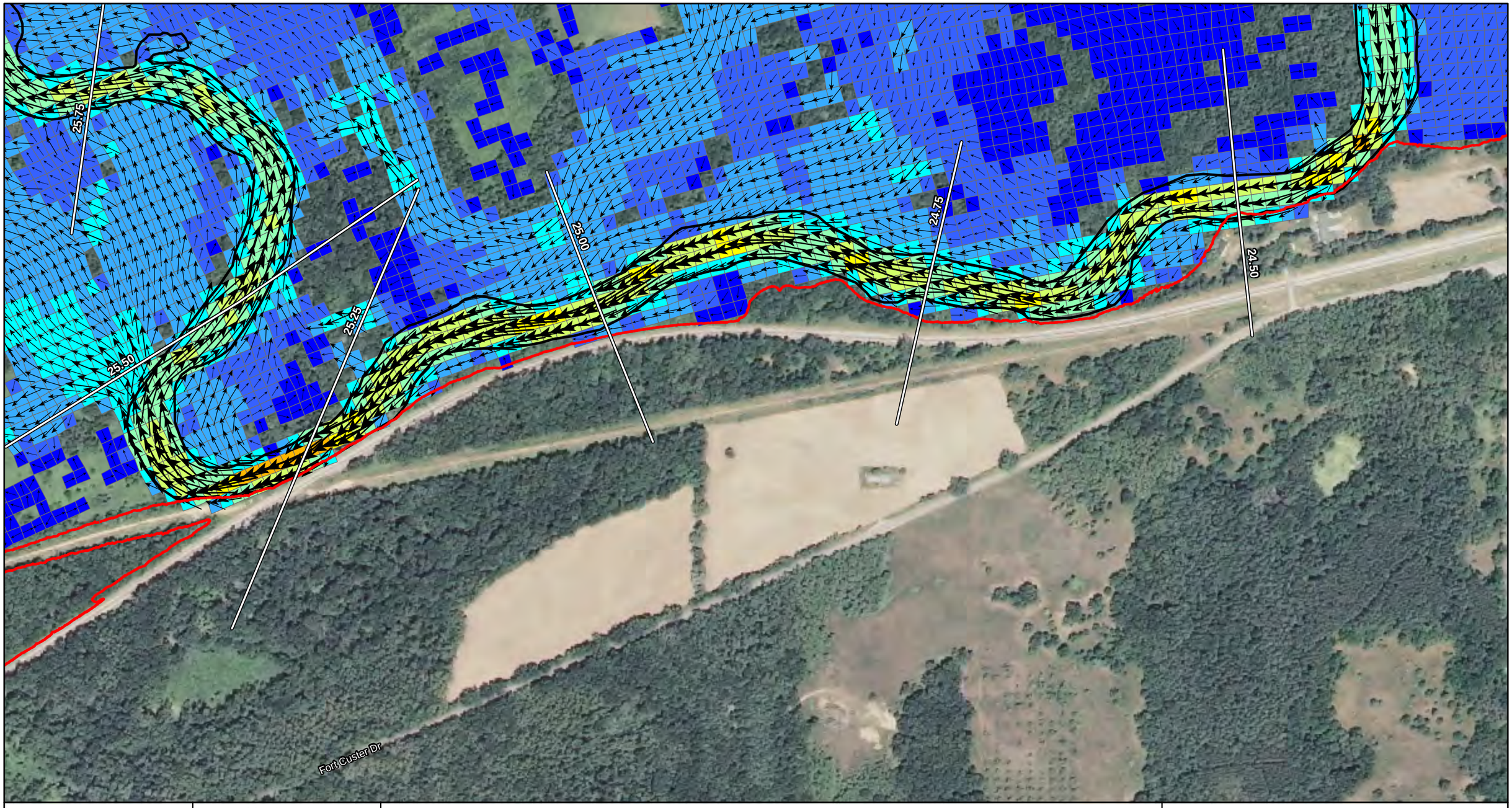
MP 24.01 - MP 24.33

SHEET 25 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

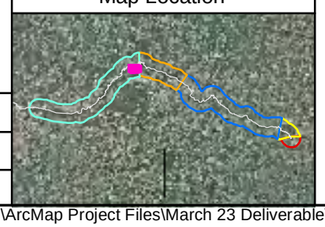
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
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- 2.5 - 3.0 ft/sec
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- Flow Direction and Relative Magnitude
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

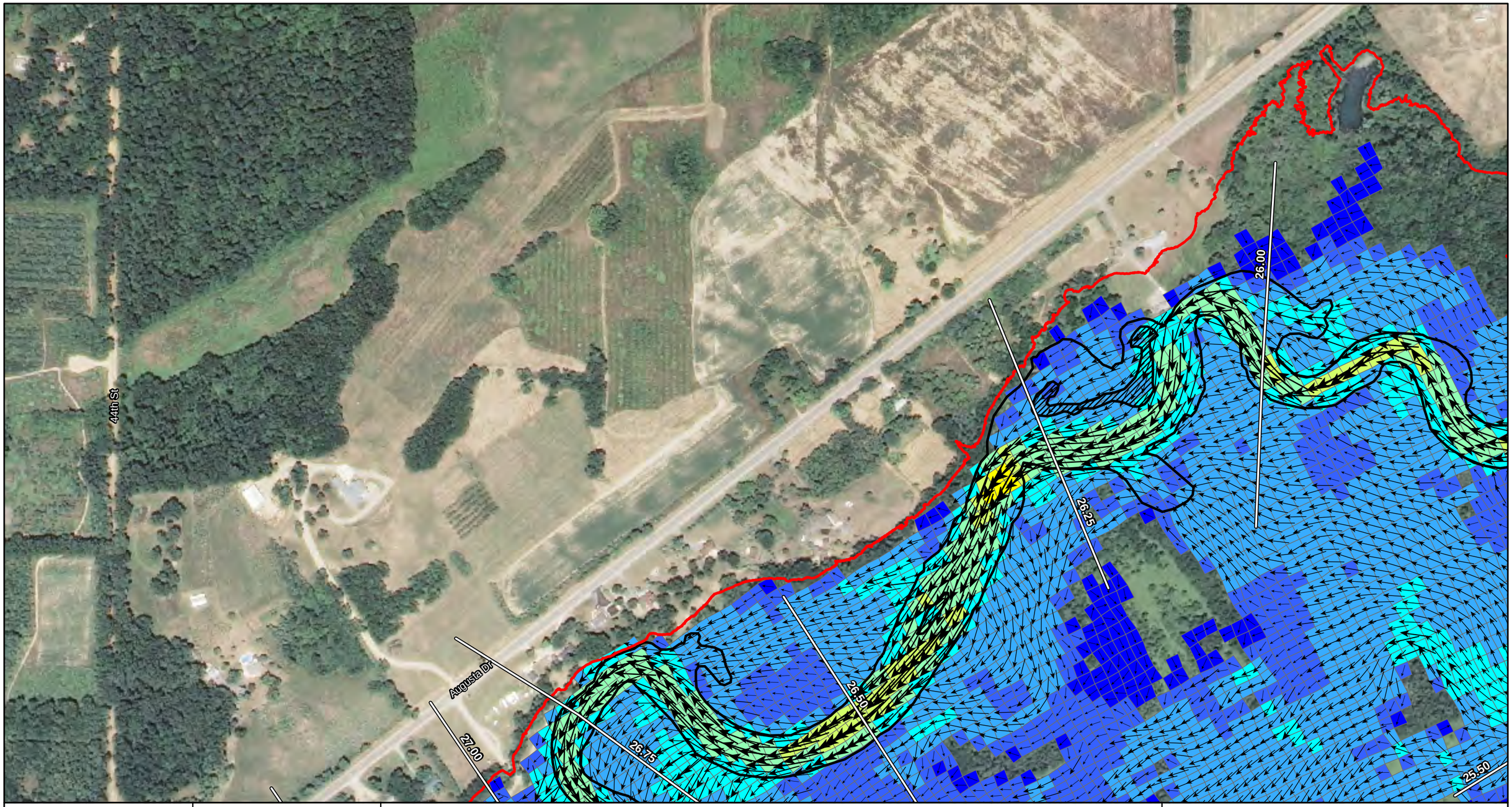
MP 24.33 - MP 25.79

SHEET 26 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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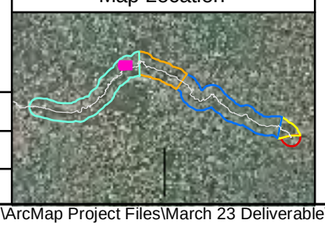
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
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- Flow Direction and Relative Magnitude
- Channel Bankline
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

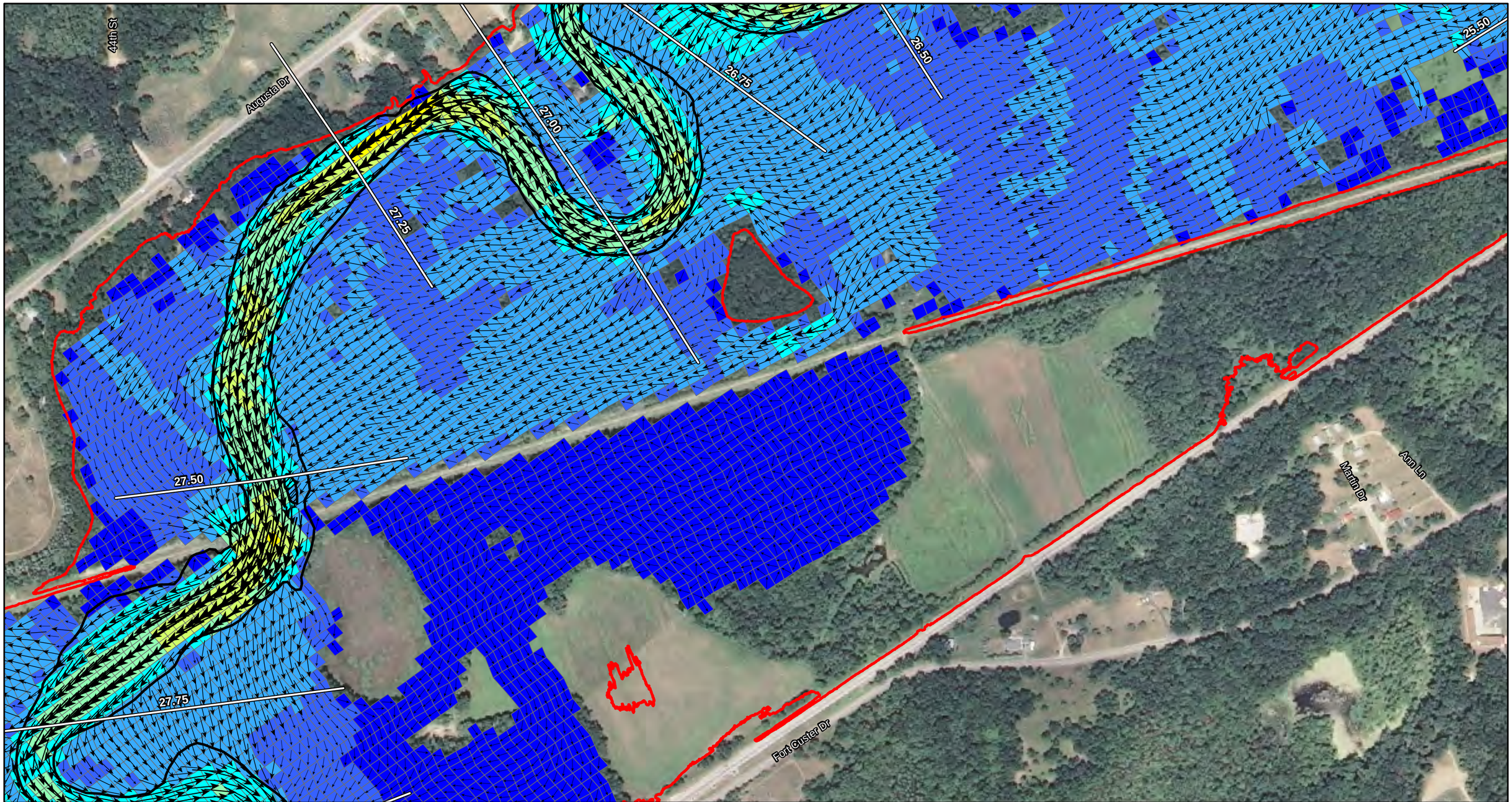
MP 25.79 - MP 26.80

SHEET 27 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

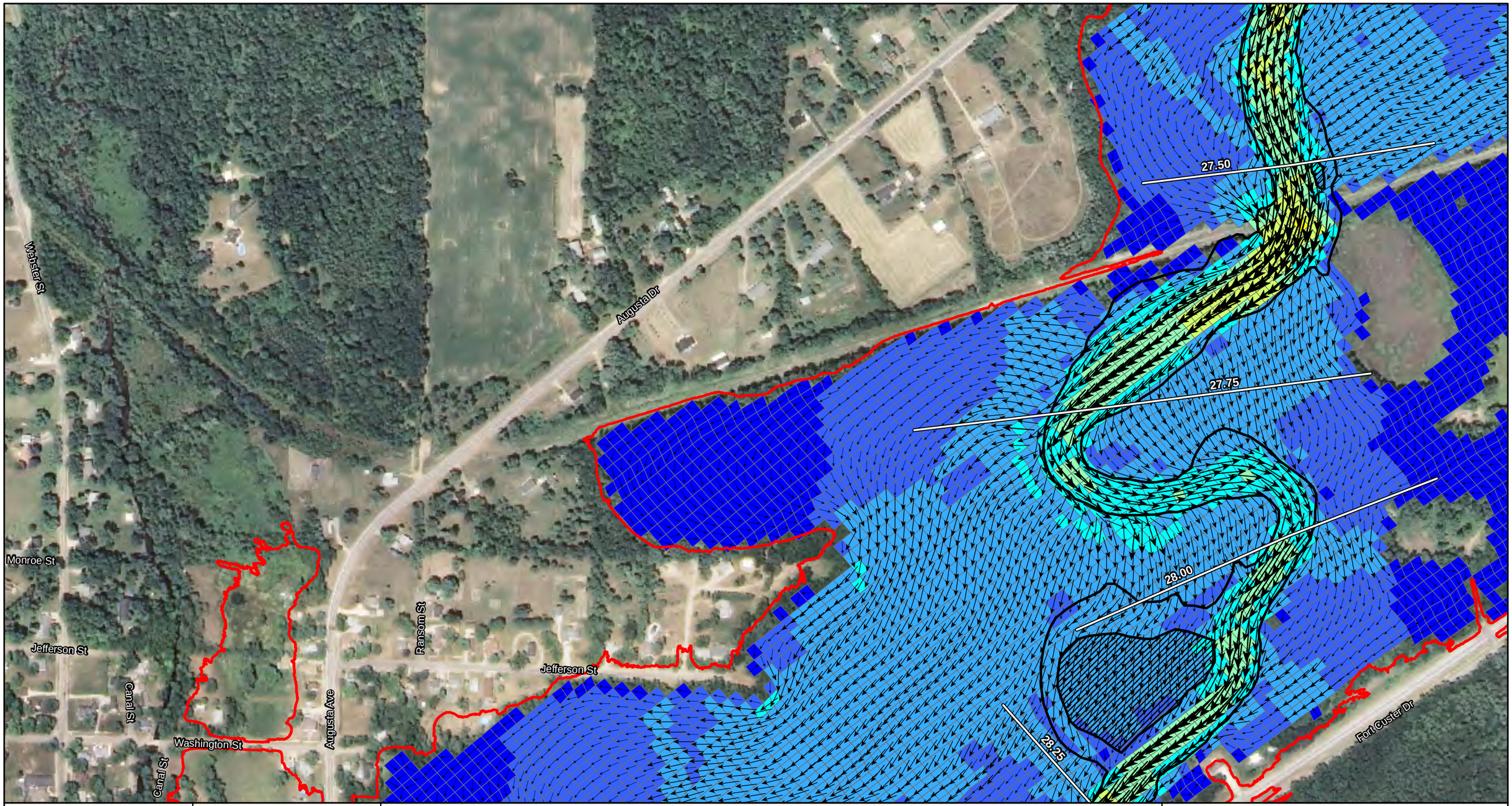
MP 26.80 - MP 27.80

SHEET 28 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

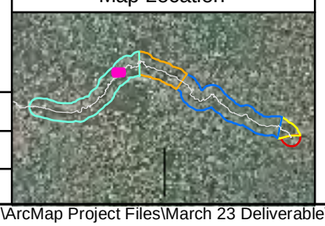
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

MP 27.80NW - MP 28.22NW

SHEET 29 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

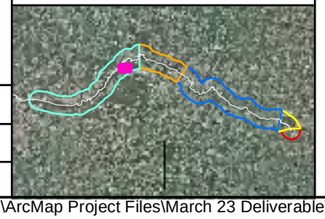
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

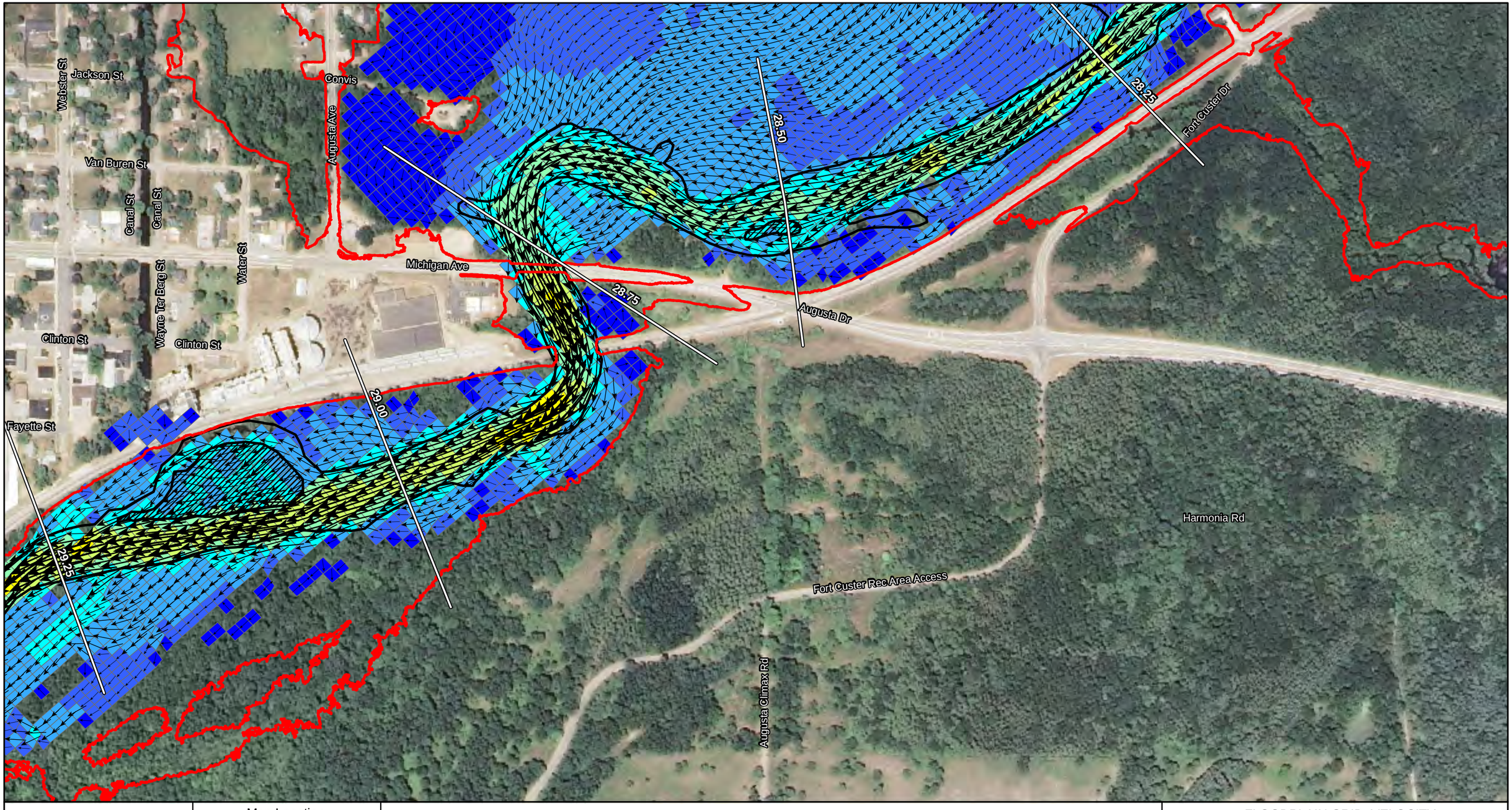
MP 27.80SE - MP 28.22SE

SHEET 30 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

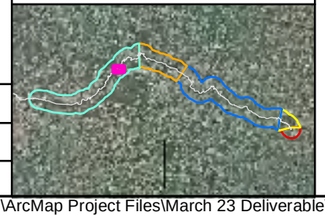
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

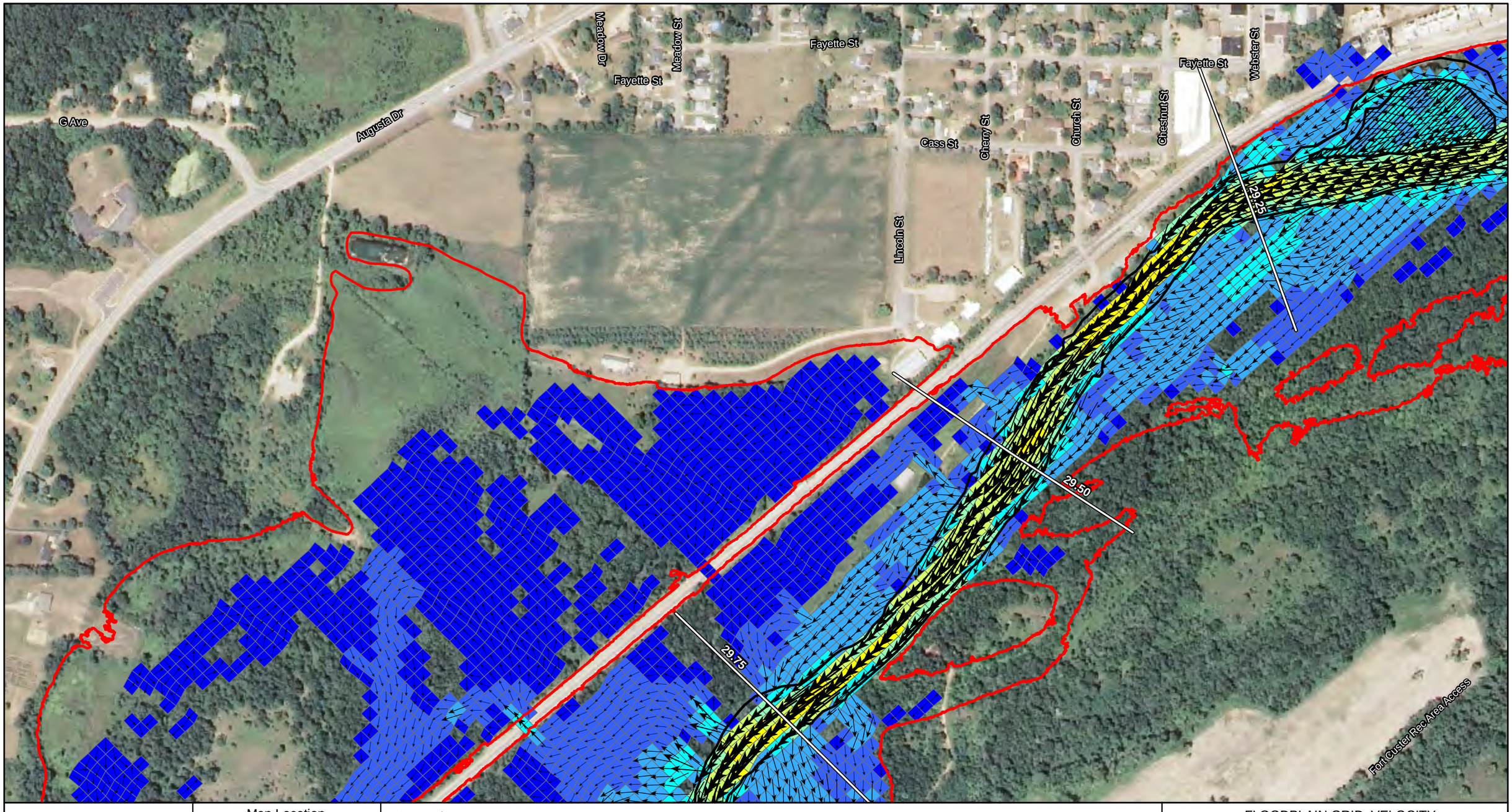
MP 28.22 - MP 29.20

SHEET 31 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

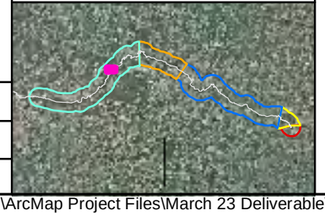
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
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- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

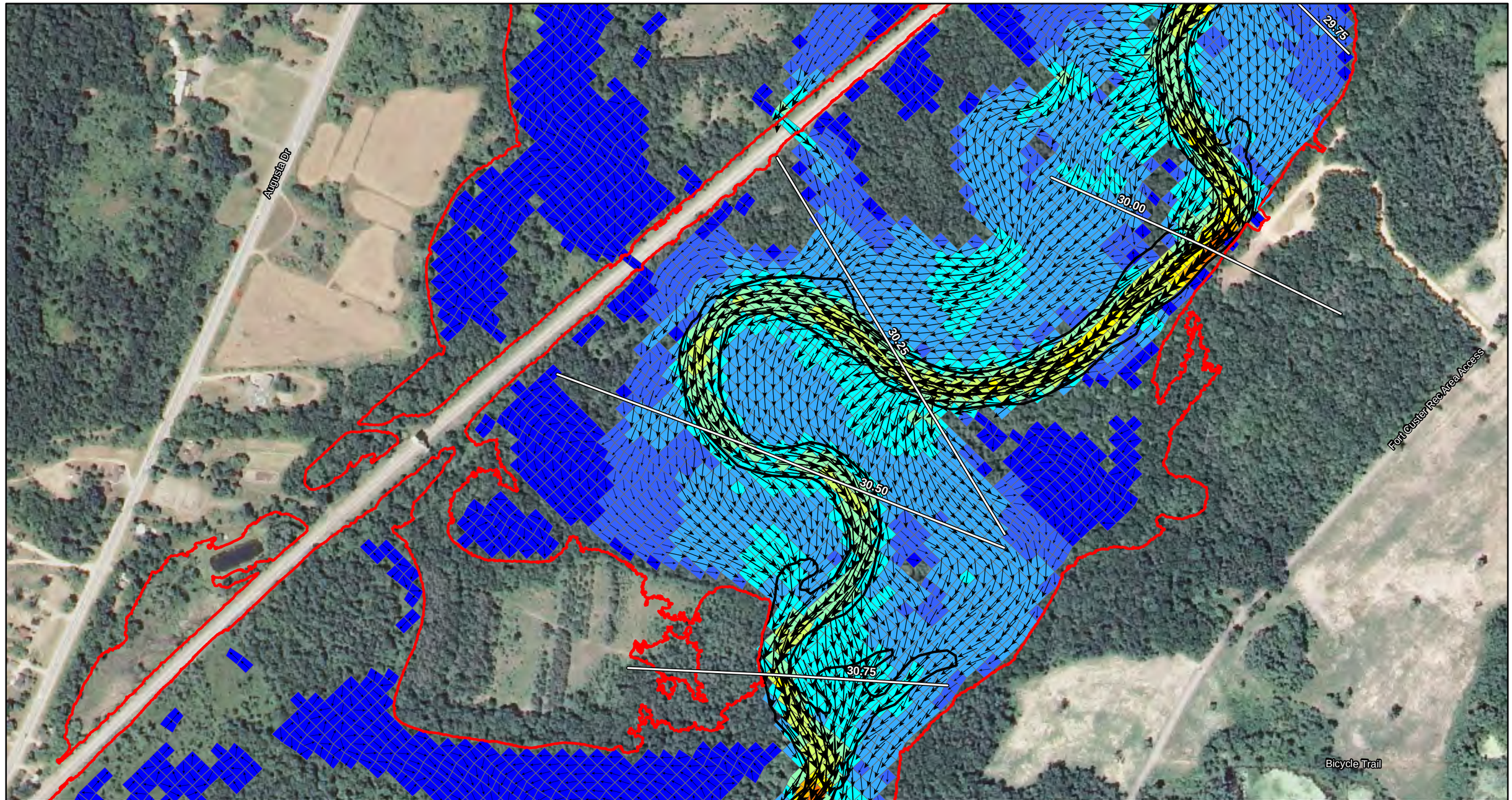
MP 29.20 - MP 29.82

SHEET 32 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

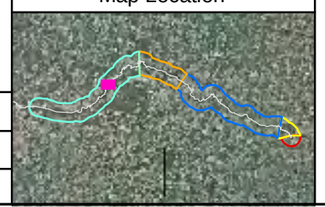
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

Aerial Photography Date: July & August 2009



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

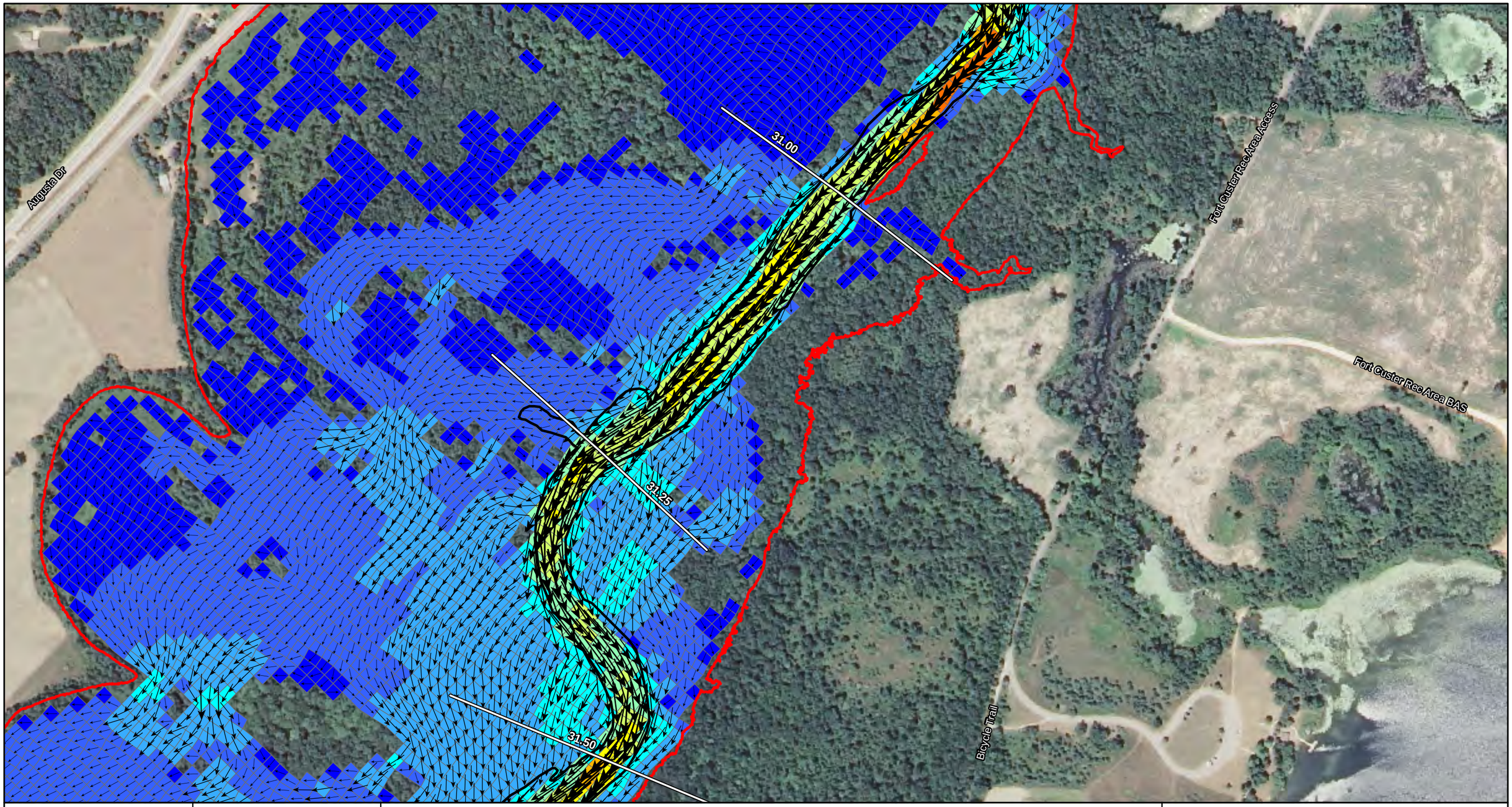
MP 29.82 - MP 30.84

SHEET 33 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

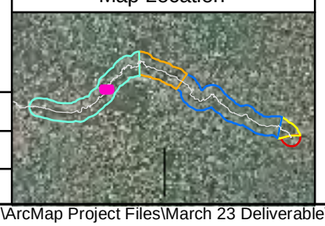
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

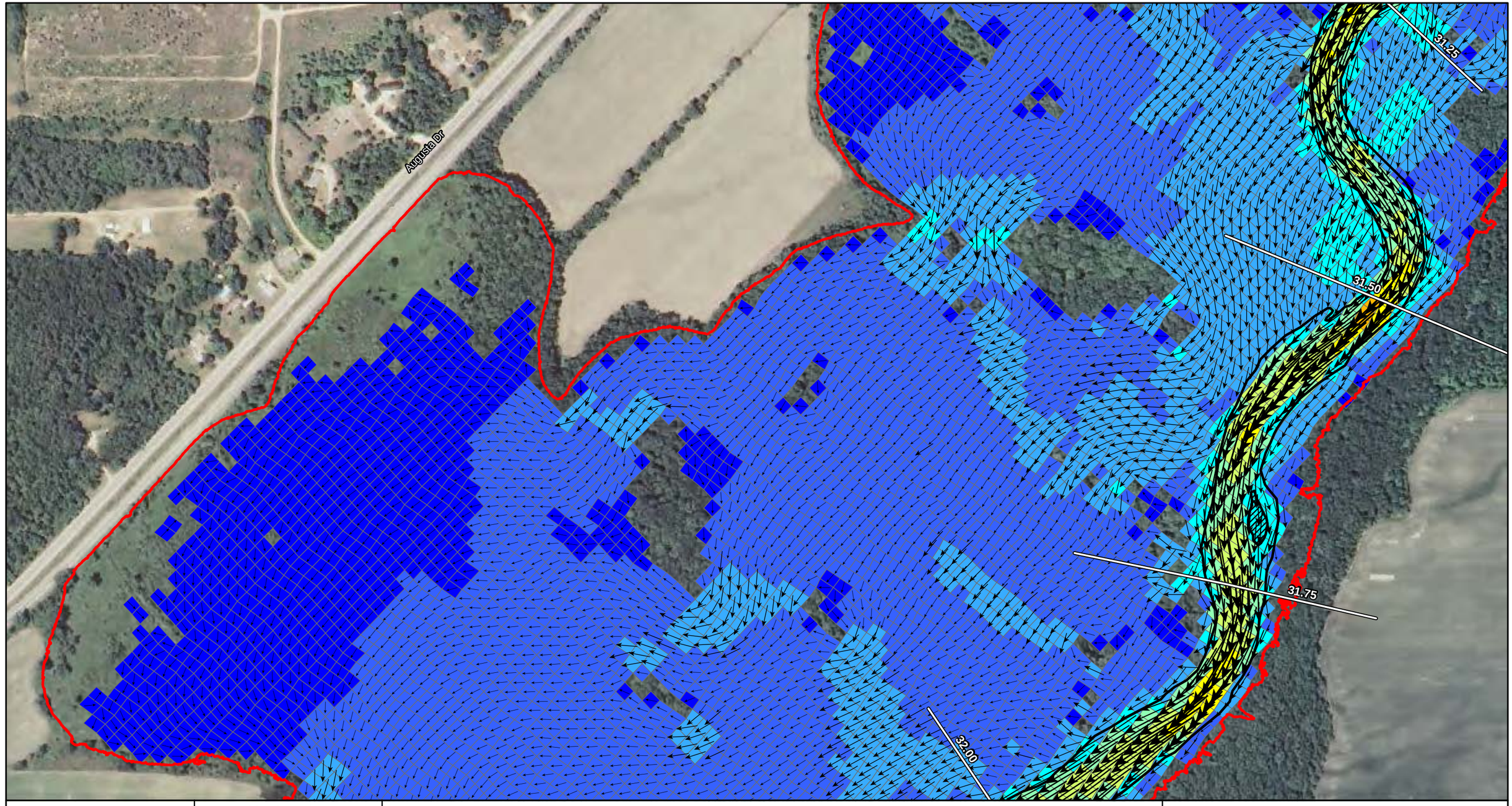
MP 29.82 - MP 30.84

SHEET 34 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

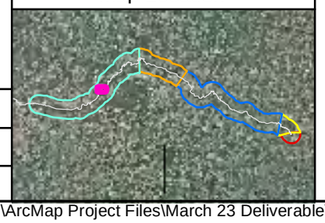
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

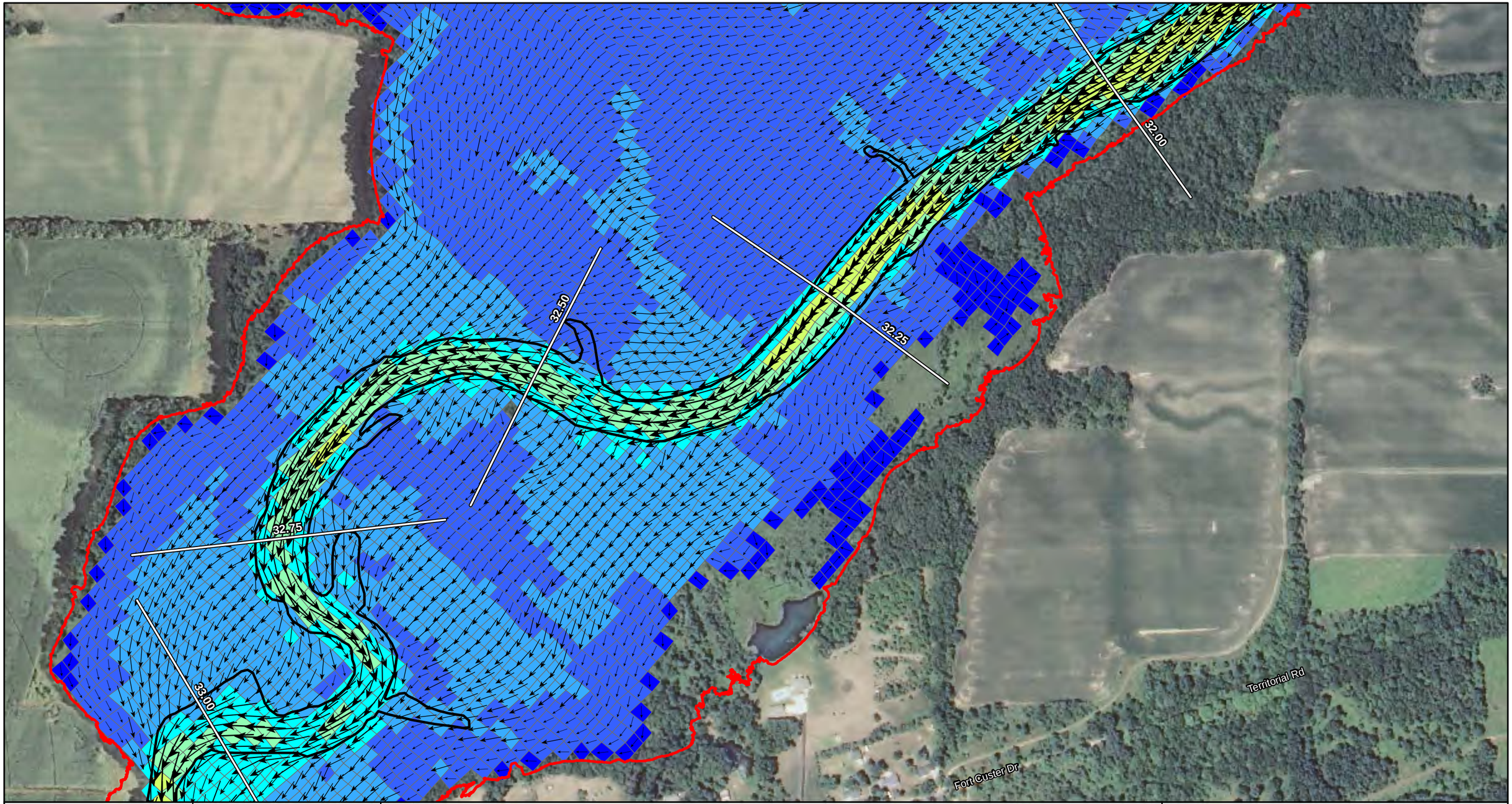
MP 31.40 - MP 31.94

SHEET 35 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

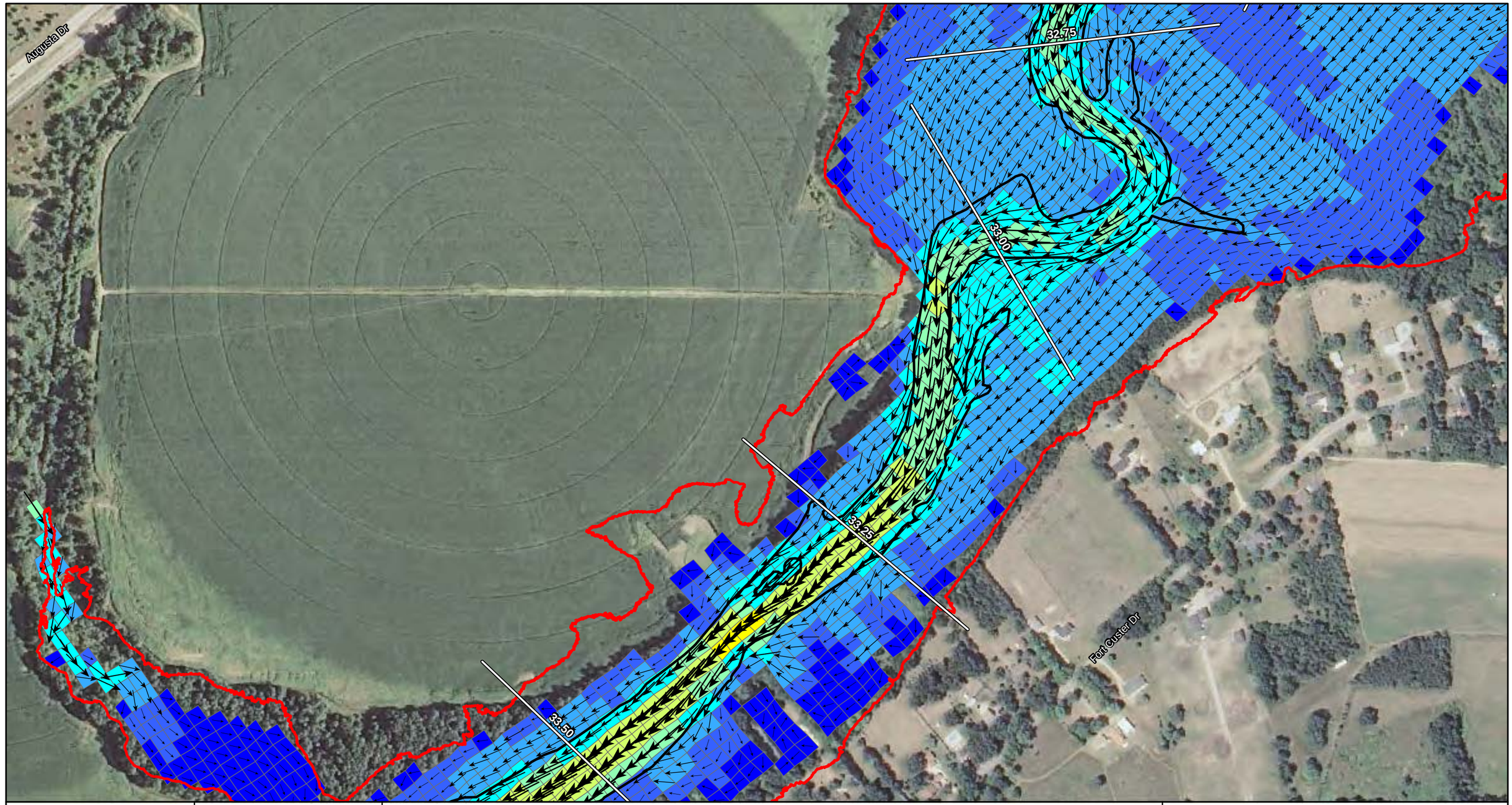
MP 31.94 - MP 33.00

SHEET 36 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

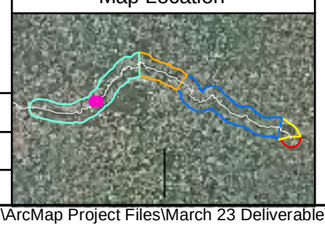
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

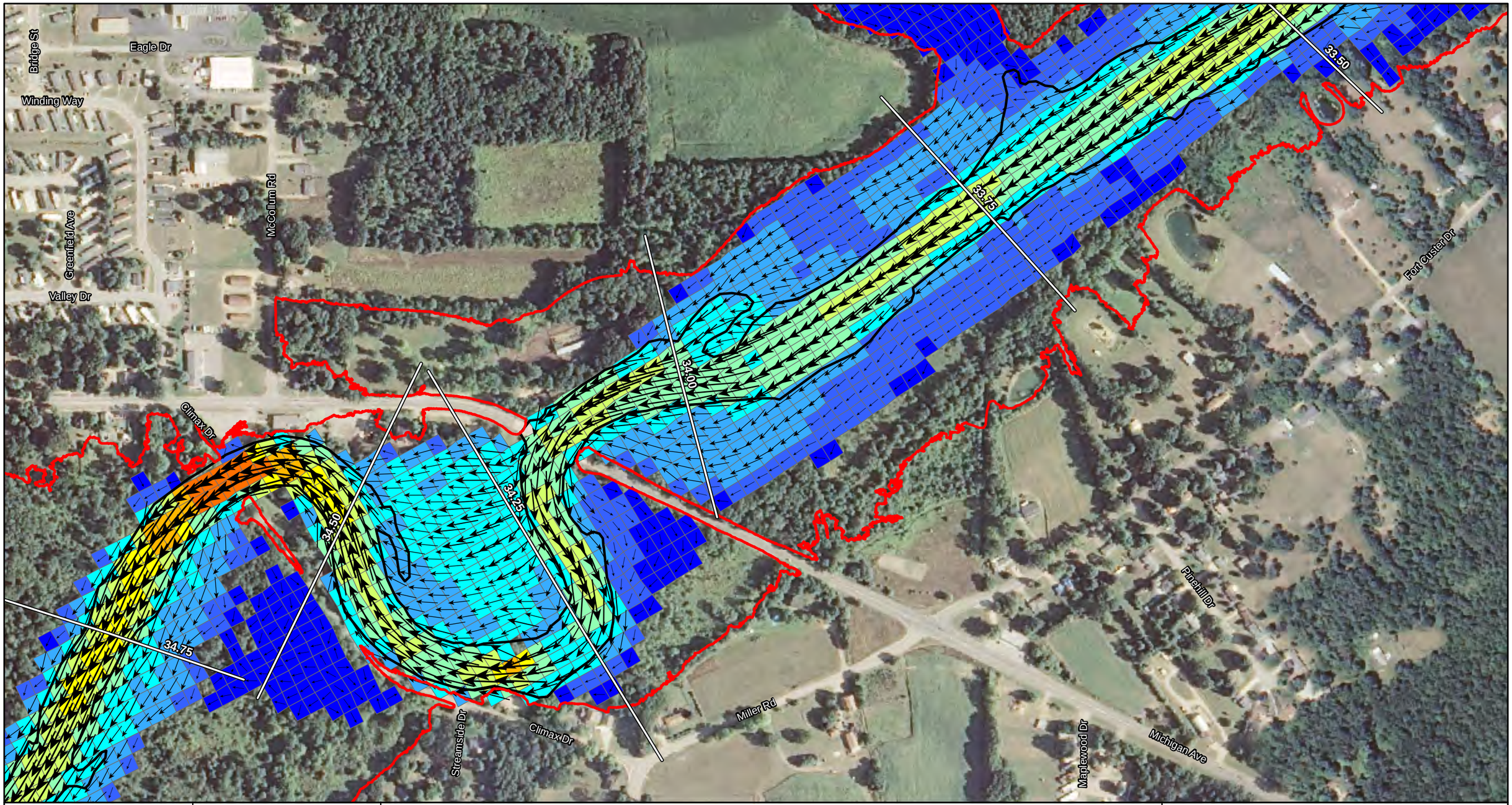
MP 33.00 - MP 33.52

SHEET 37 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

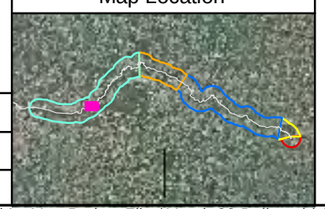
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

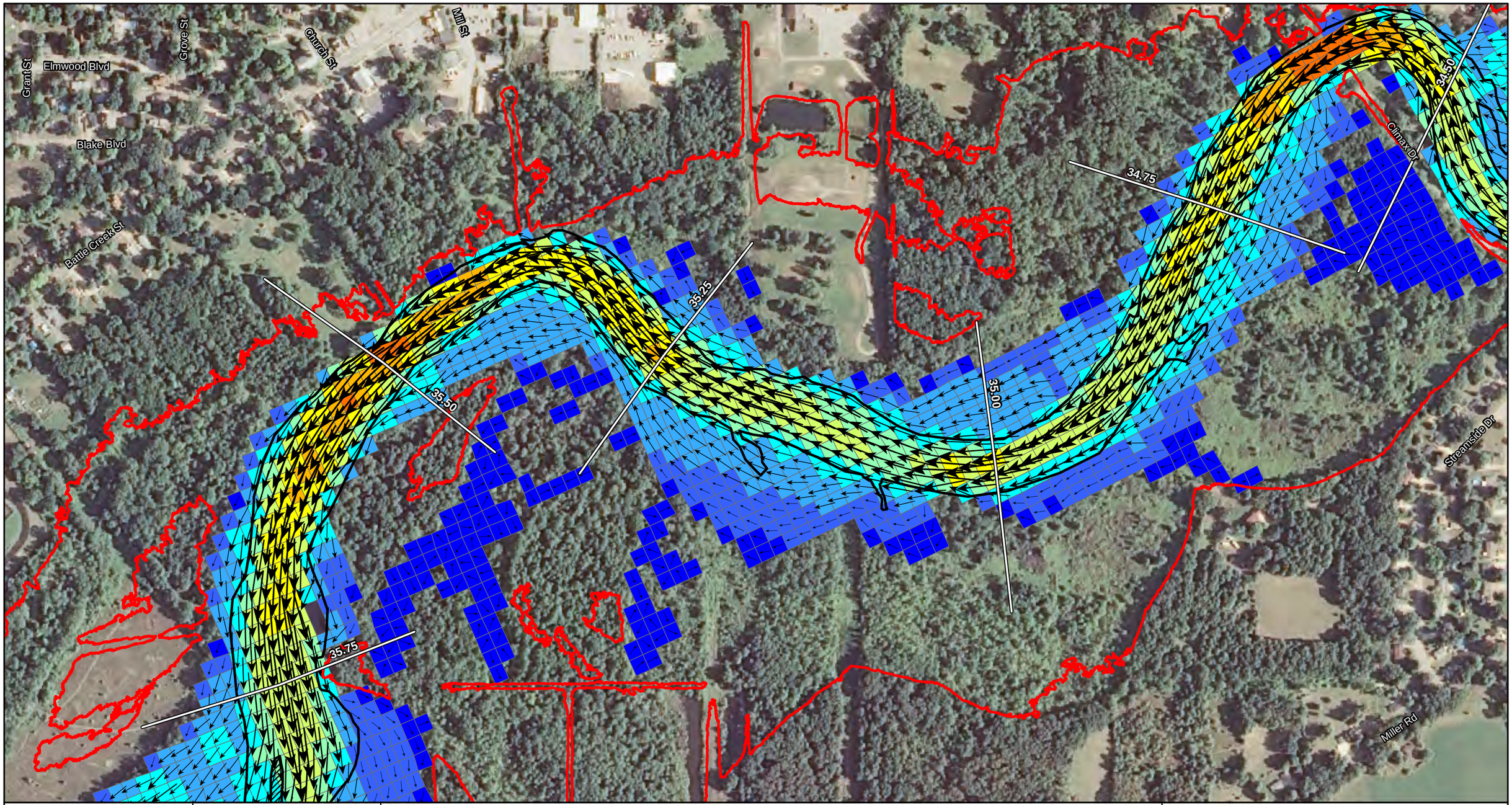
MP 33.52 - MP 34.70

SHEET 38 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

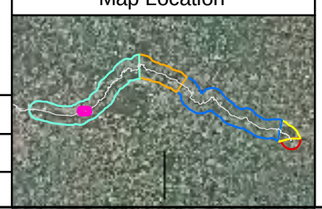
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
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- Flow Direction and Relative Magnitude
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

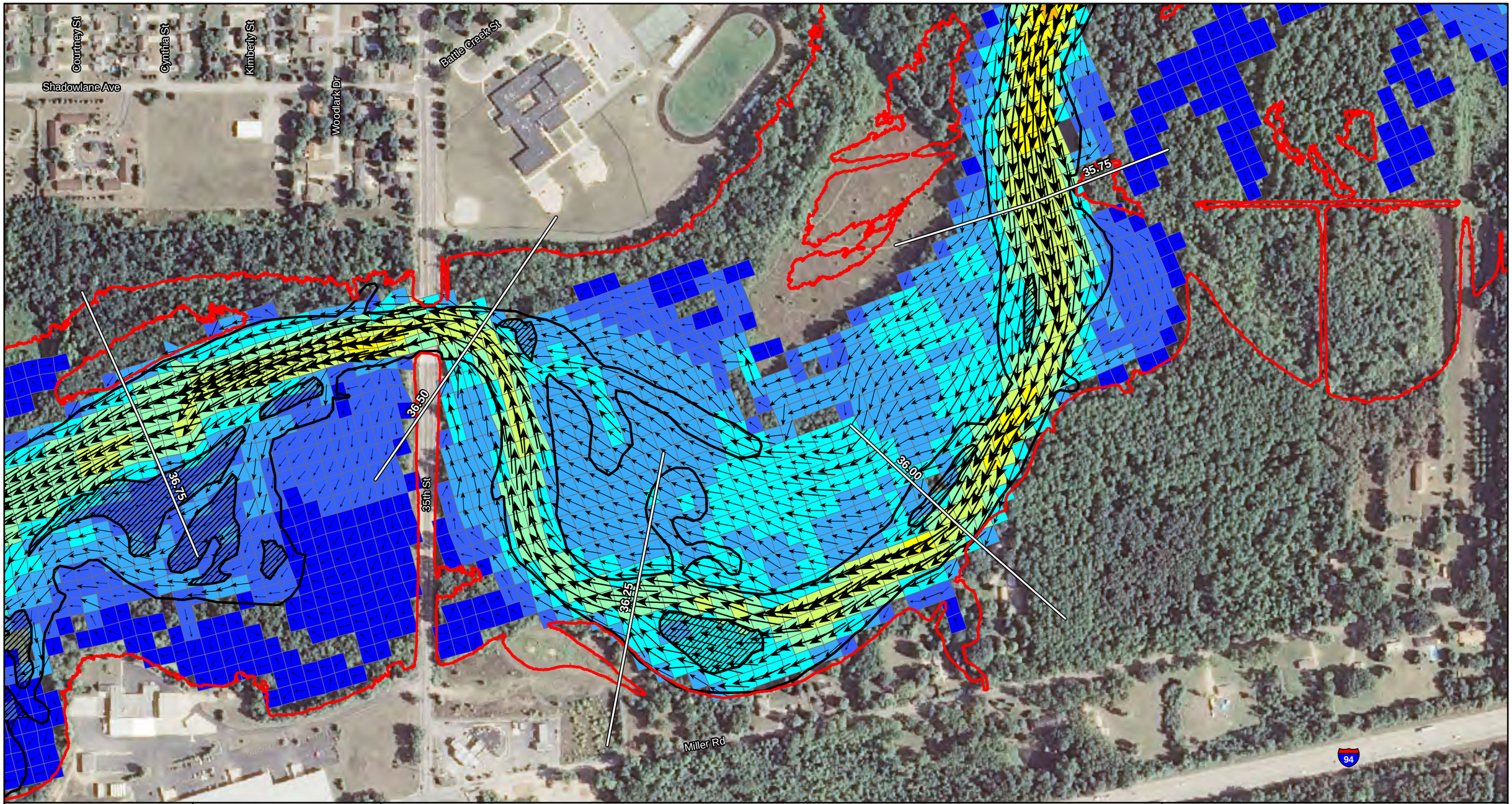
MP 34.70 - MP 35.75

SHEET 39 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

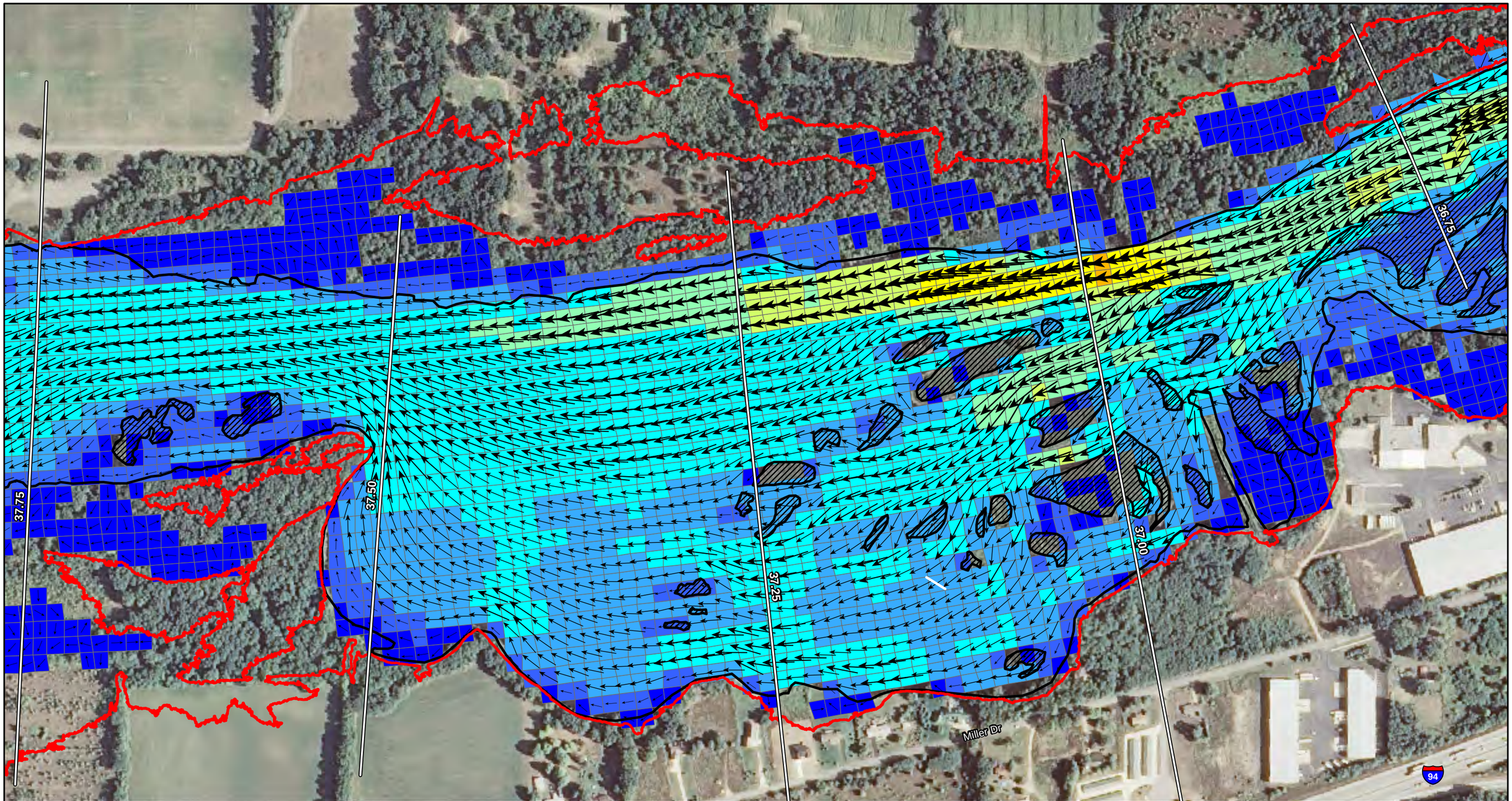
MP 35.75 - MP 36.75

SHEET 40 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

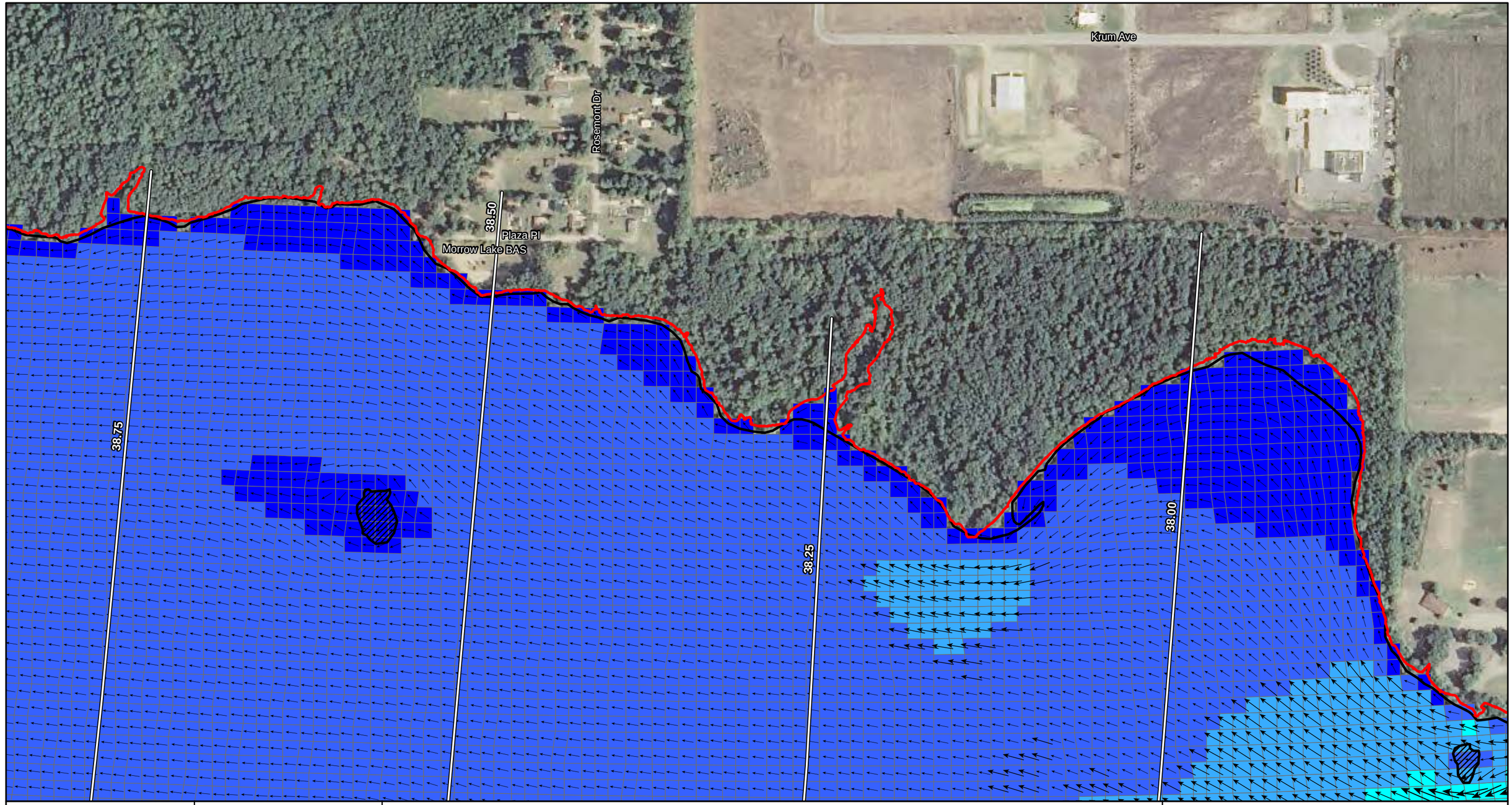
MP 36.75 - MP 37.75

SHEET 41 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

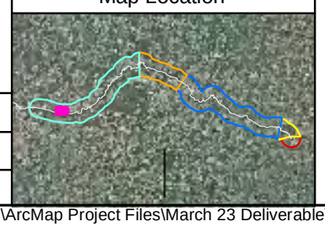
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

MP 36.75 - MP 37.75

SHEET 42 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

Aerial Photography Date: July & August 2009

38.75

38.50

38.25

38.00

37.75

94

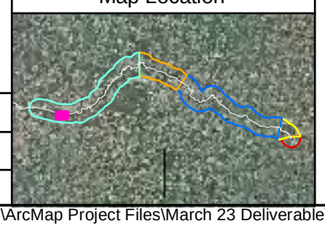
Lyon Rd

Miller Dr

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

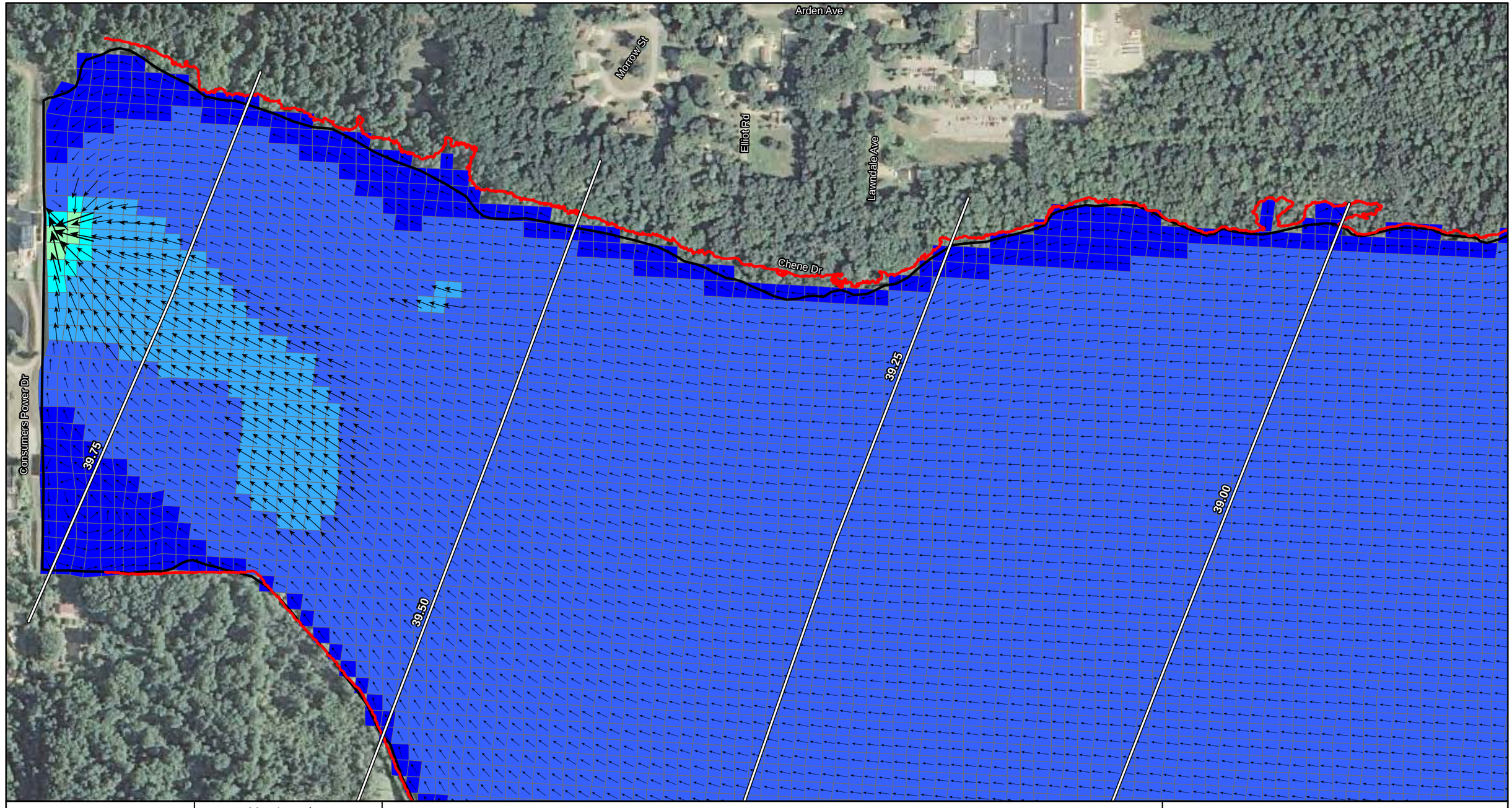
MP 37.75S - MP 38.80S

SHEET 43 OF 45

ENBRIDGE LINE 6B MP 608
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ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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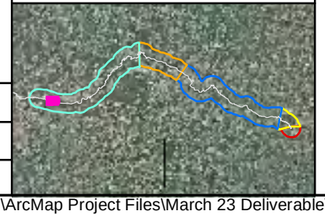
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

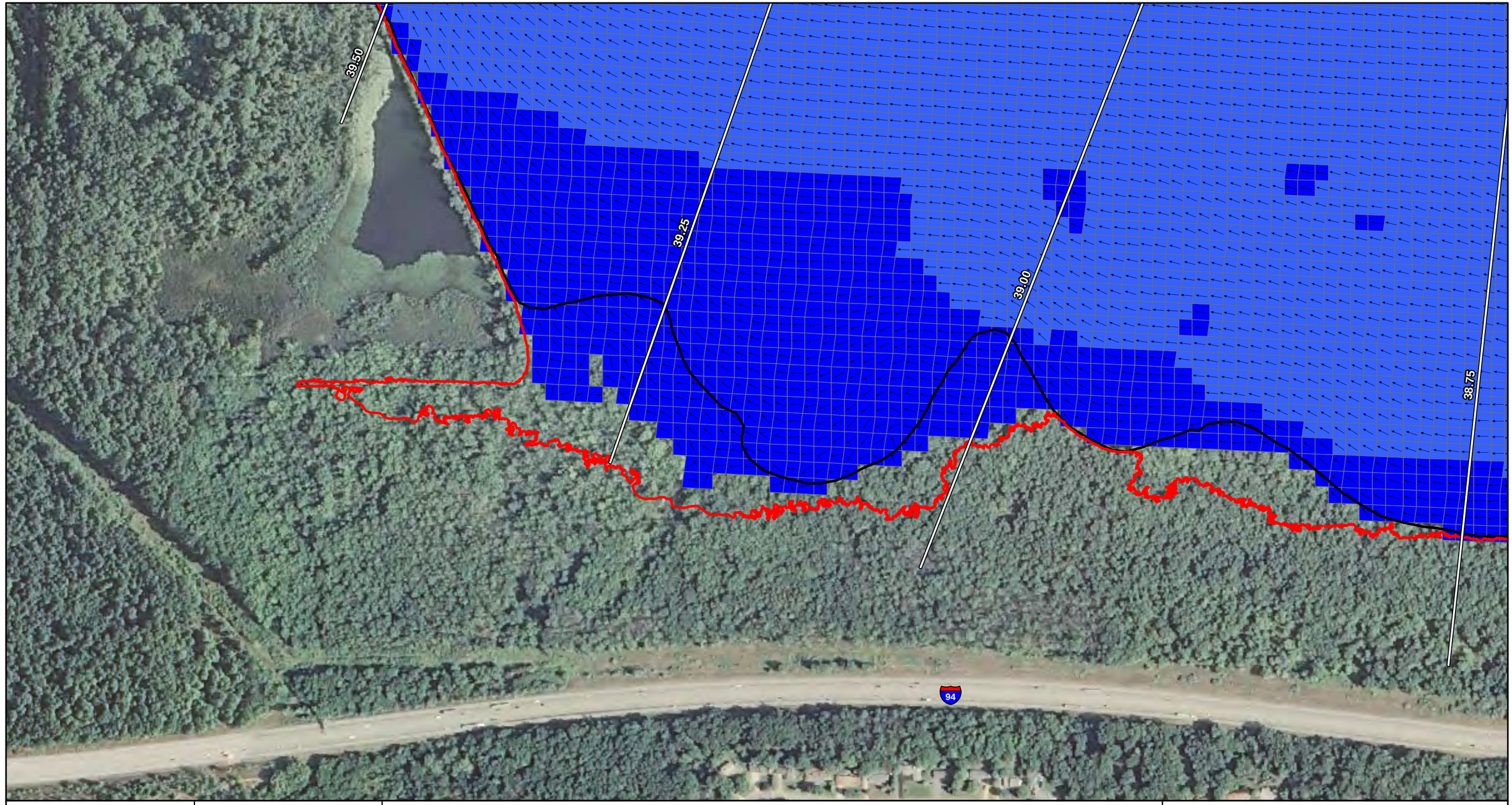
MP 38.80N - MP 39.95N

SHEET 44 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

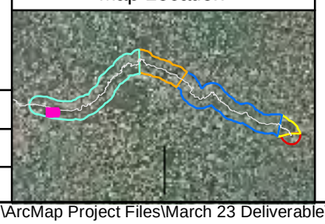
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

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ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
JUNE 3, 2011

MP 38.80S - MP 39.95S

SHEET 45 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_Jun3_2011.mxd

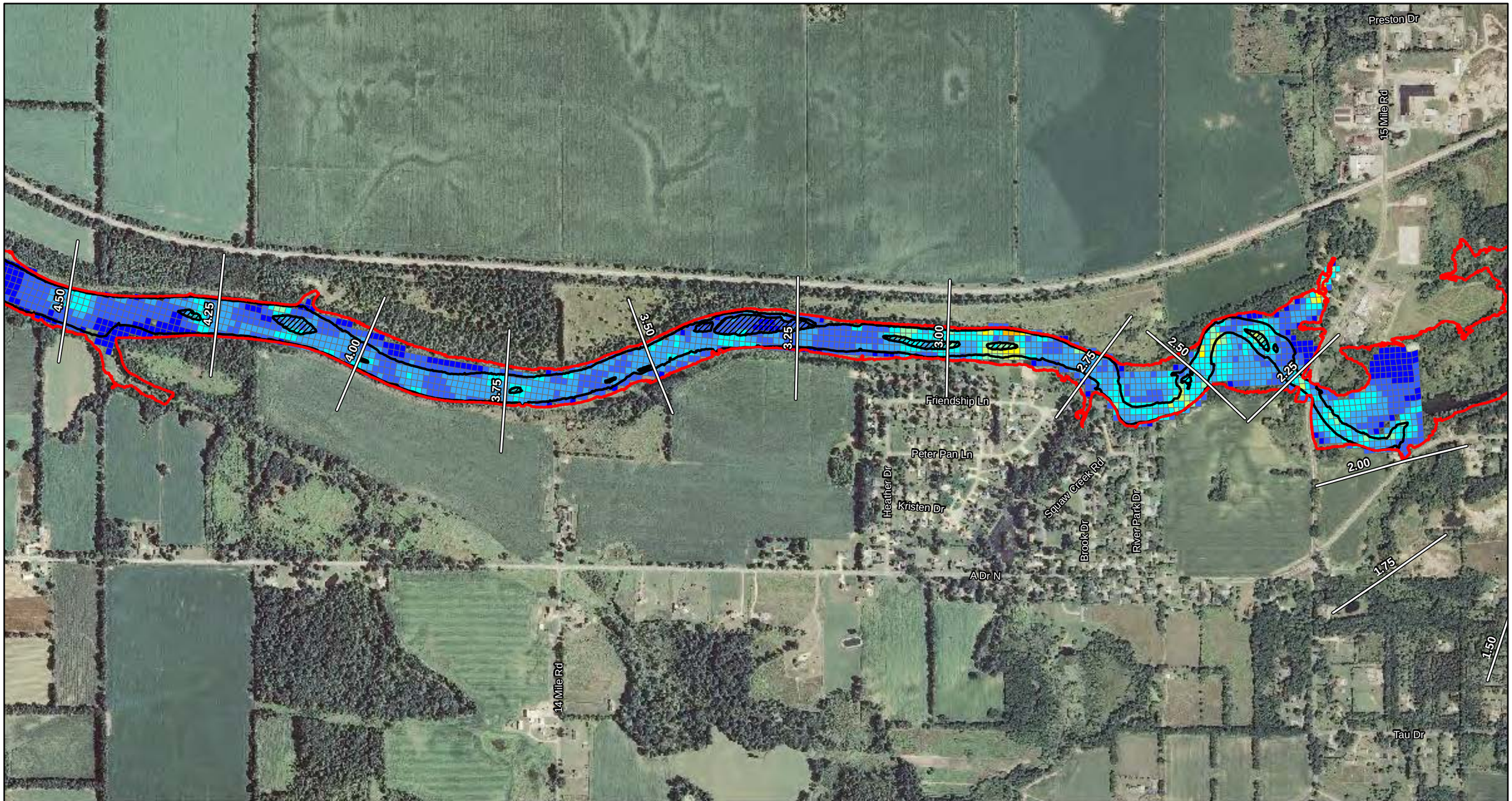
Aerial Photography Date: July & August 2009

Figure 5-18

Floodplain Grid: Bed Shear Stress

May 27, 2011

Sheets 1 through 16



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 27, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 27, 2011

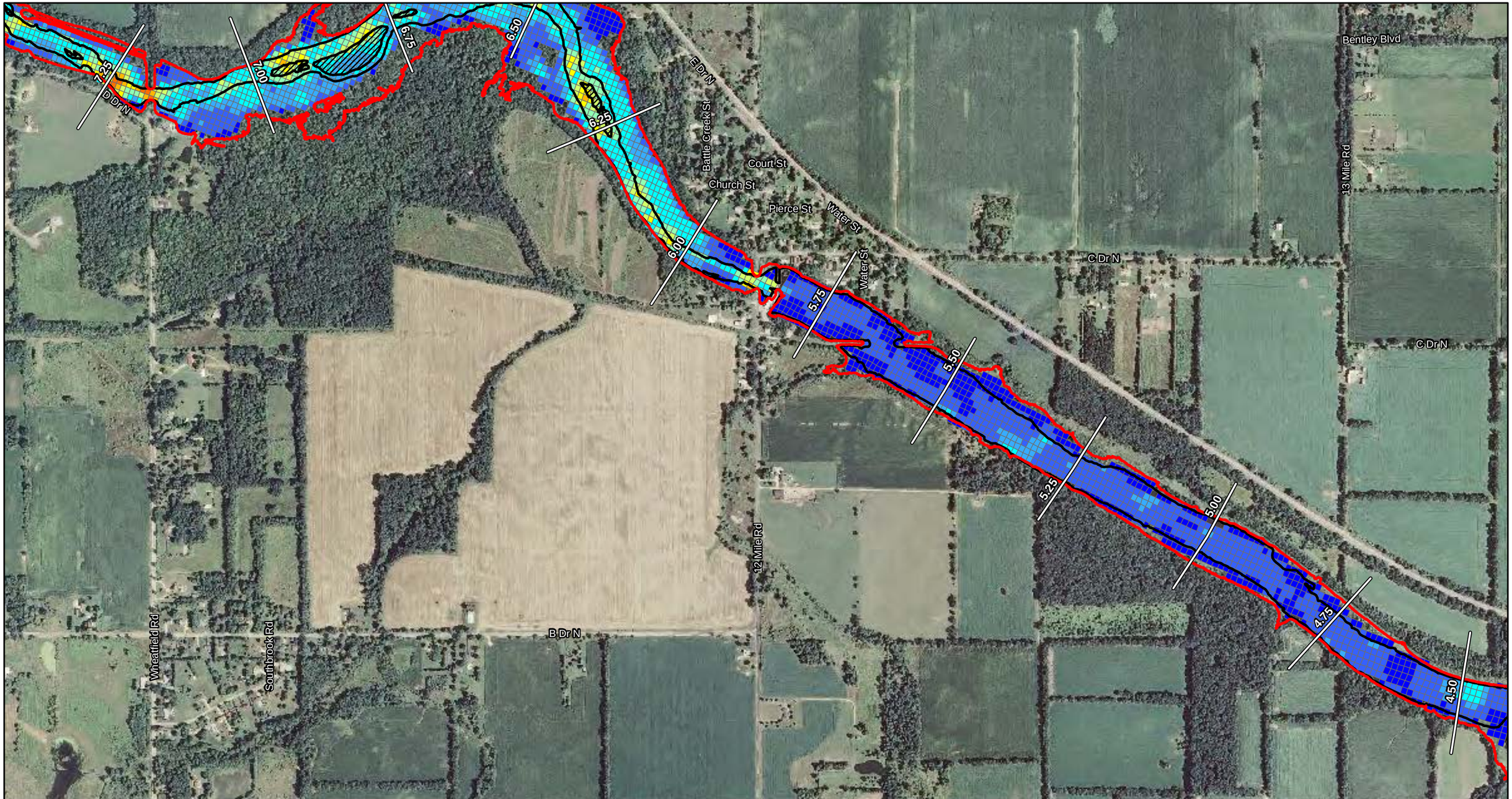
MP 1.50 - MP 4.50

SHEET 1 OF 16

ENBRIDGE LINE 6B MP 608
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X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_May27_2011.mxd

Aerial Photography Date: July & August 2009



Map Location



Legend

Bed Shear Stress (Pa), May 27, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

N

0 400 800 1,600
Scale in Feet

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 27, 2011

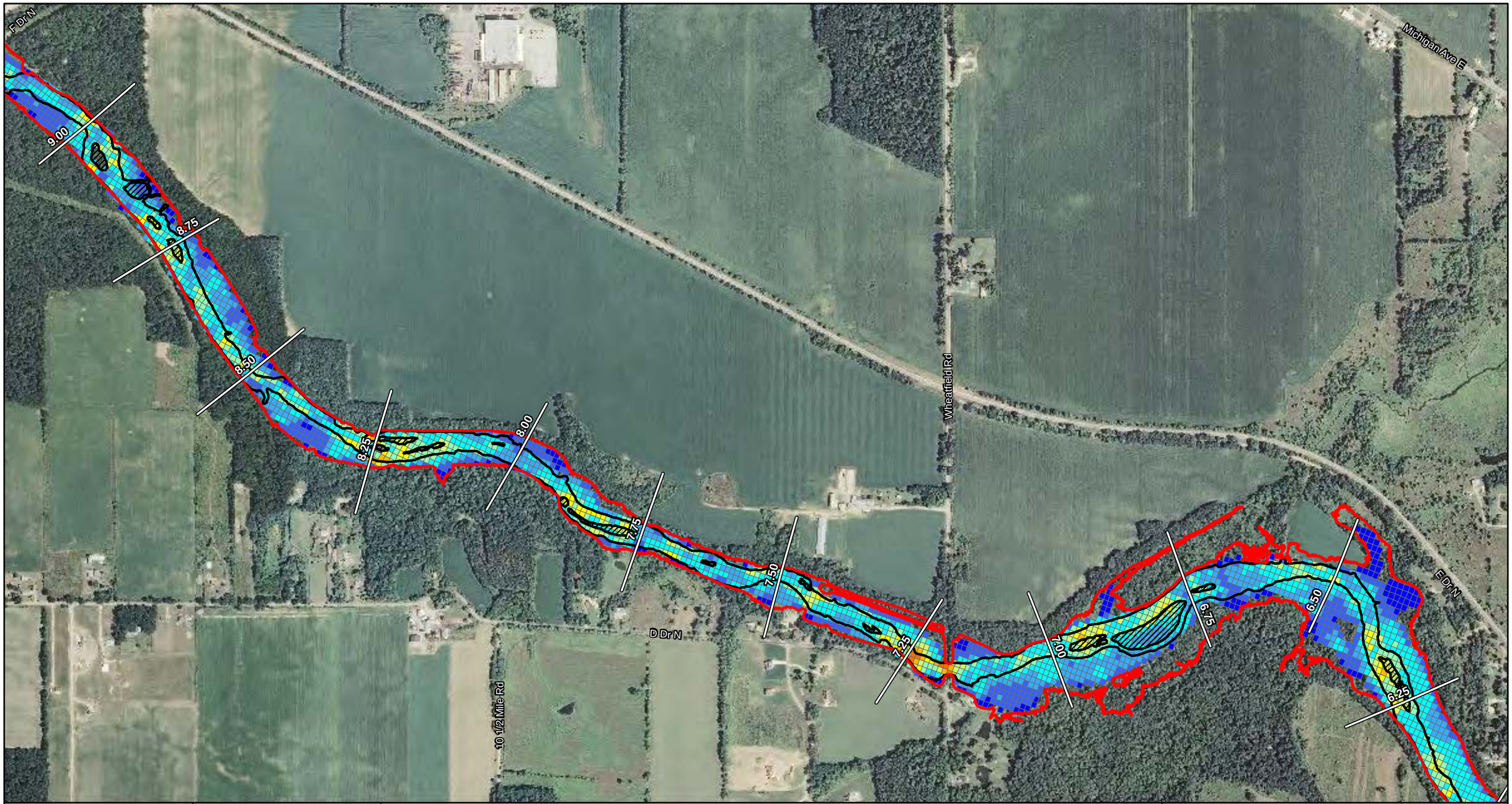
MP 4.50 - MP 6.25

SHEET 2 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
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X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_May27_2011.mxd

Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 27, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 27, 2011

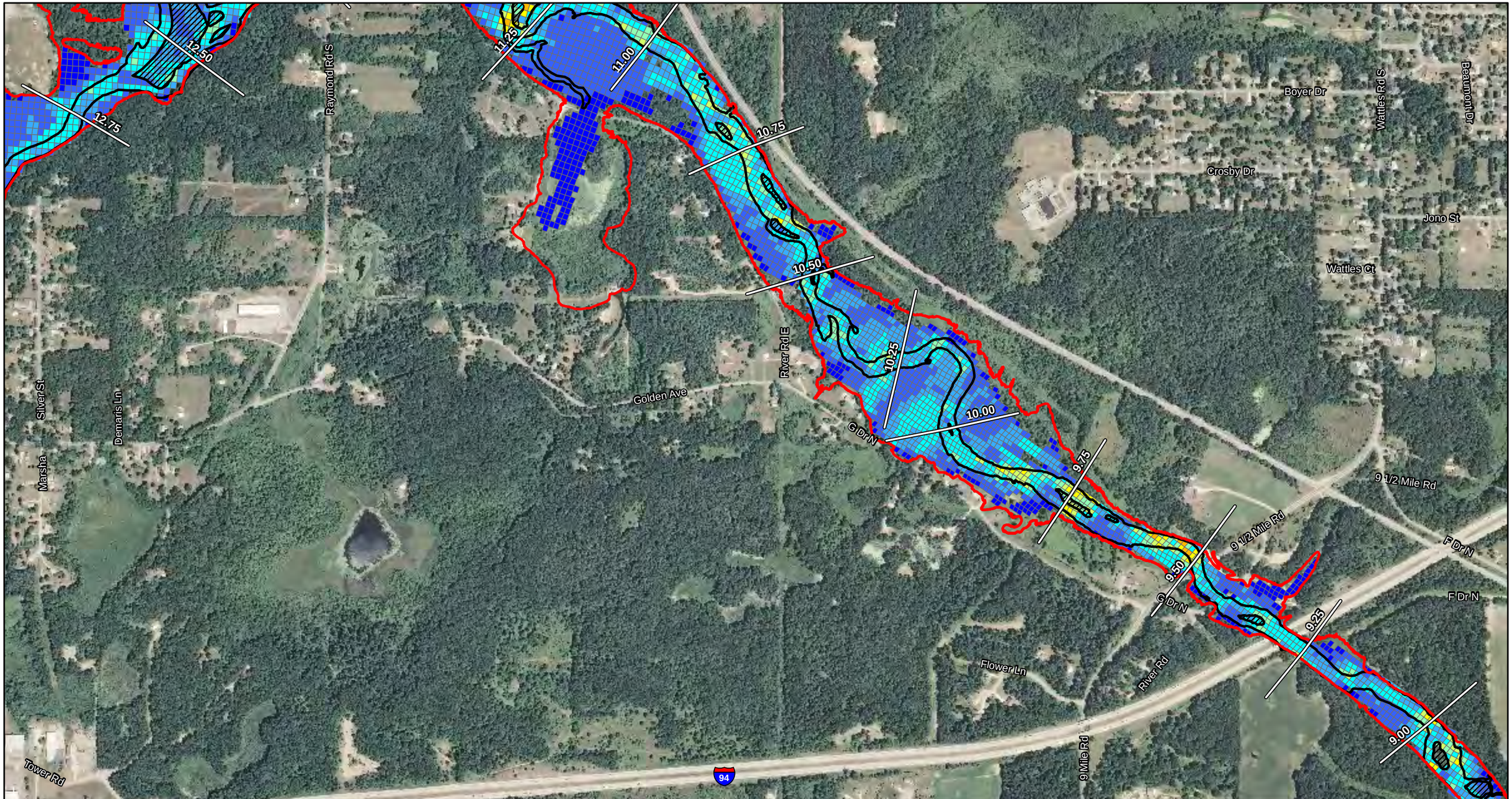
MP 6.25 - MP 9.00

SHEET 3 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 27, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 27, 2011

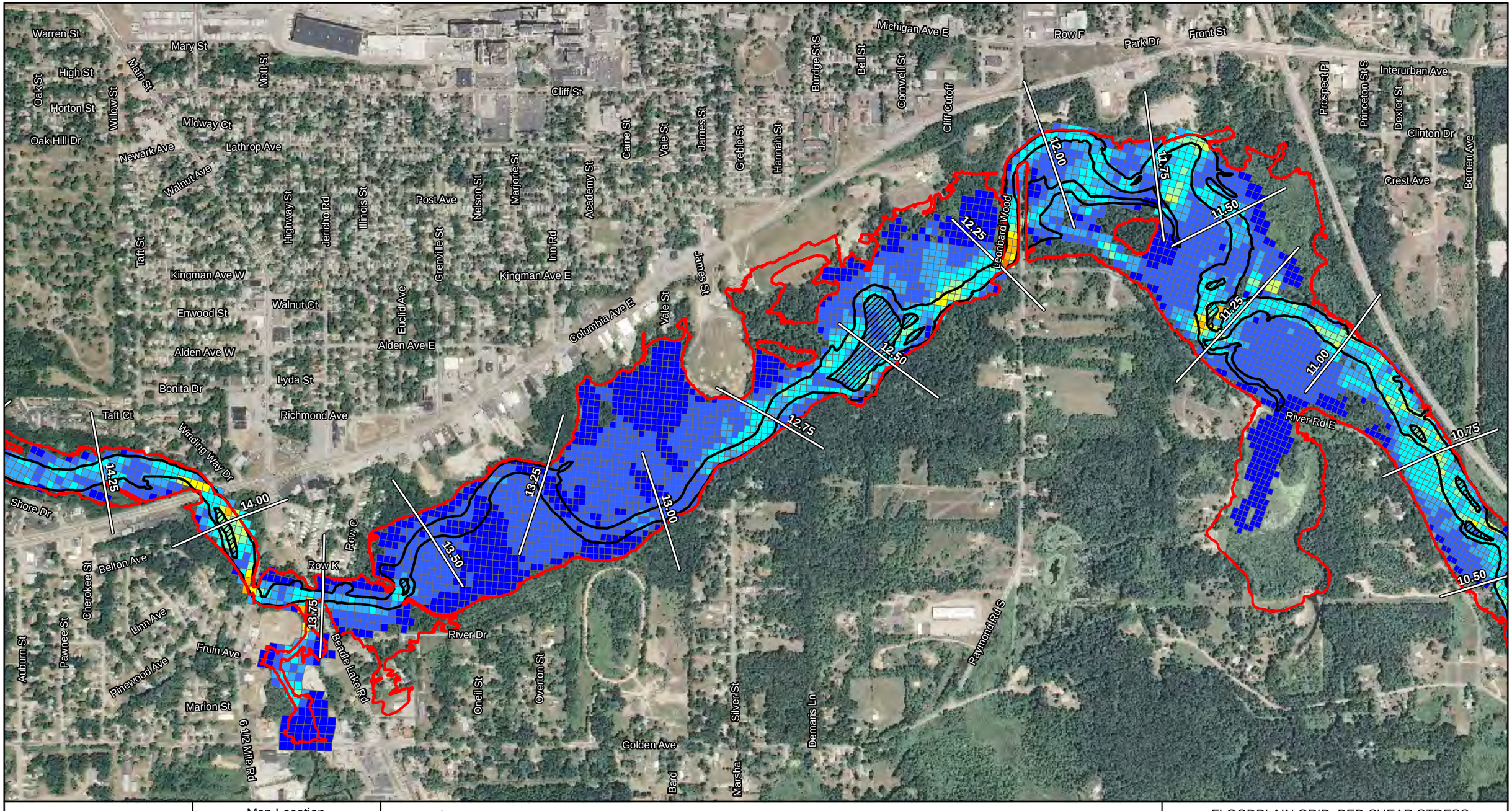
MP 9.00 - MP 10.50

SHEET 4 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_May27_2011.mxd

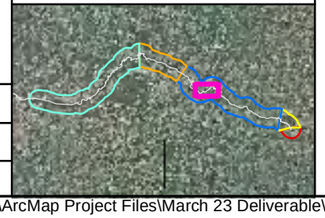
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 27, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 27, 2011

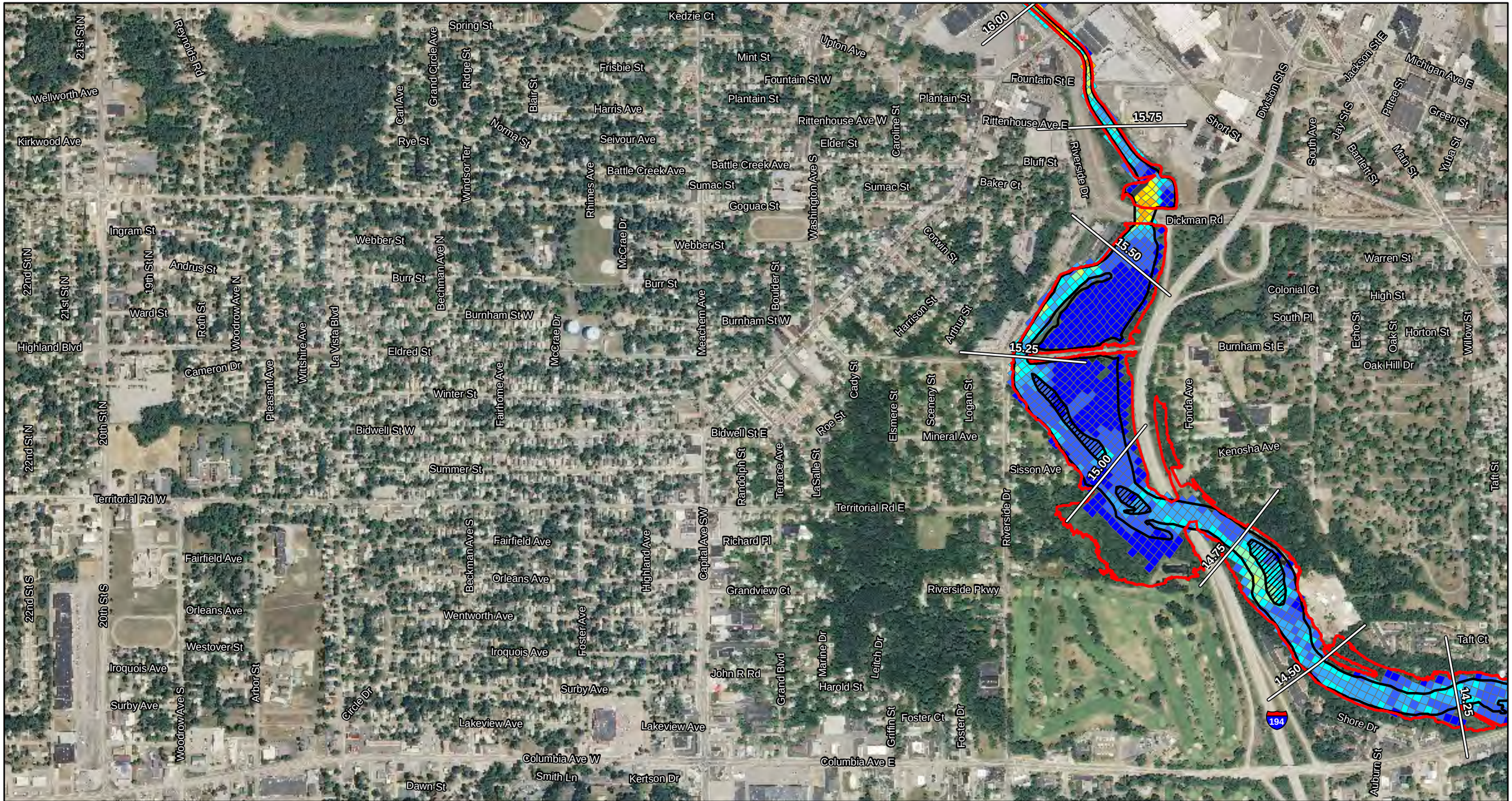
MP 10.50 - MP 14.25

SHEET 5 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 27, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 27, 2011

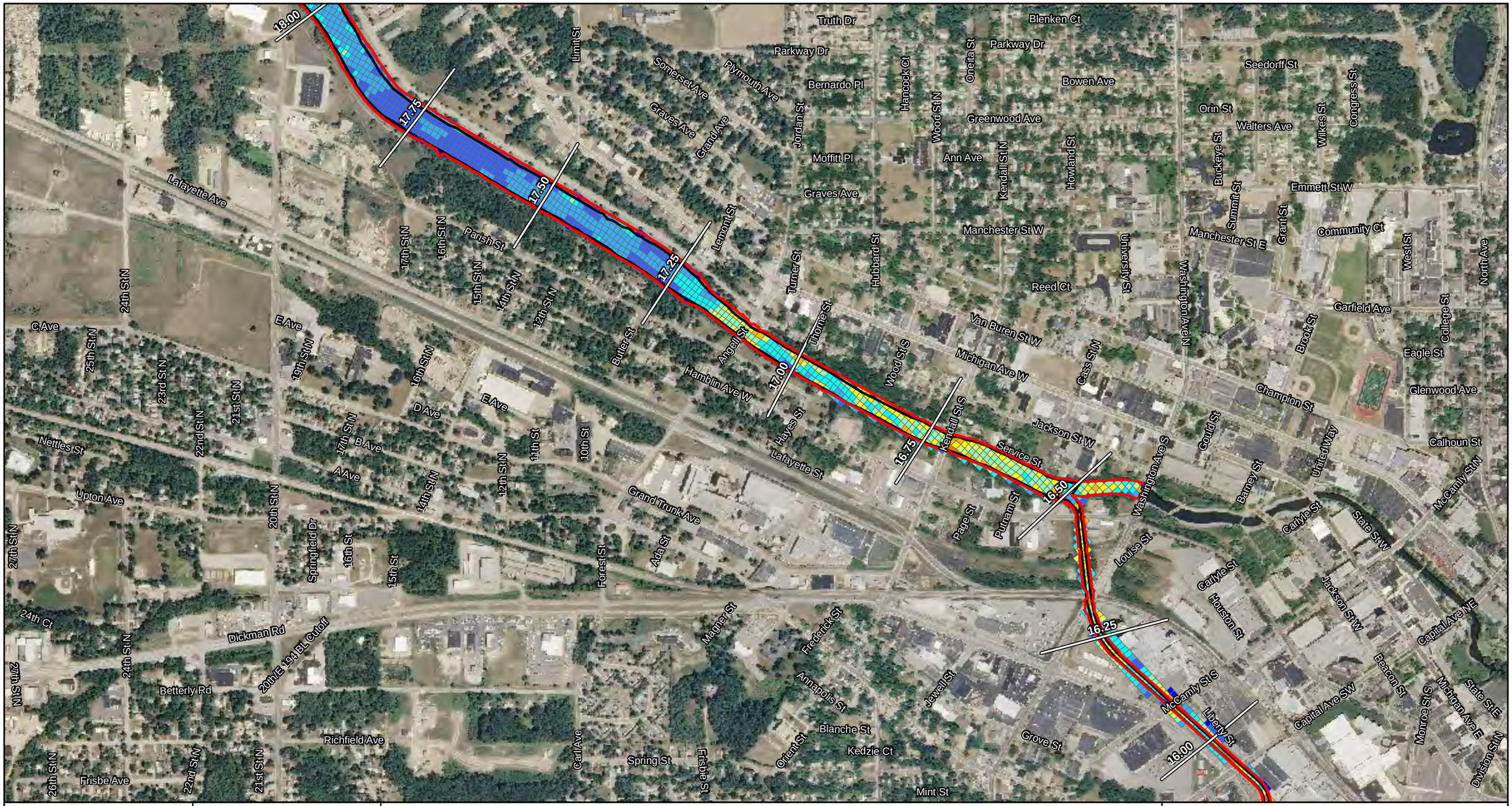
MP 14.25 - MP 16.00

SHEET 6 OF 16

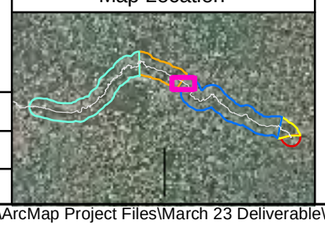
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_May27_2011.mxd

Aerial Photography Date: July & August 2009



Map Location



Legend

Bed Shear Stress (Pa), May 27, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

N

0 400 800 1,600
Scale in Feet

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 27, 2011

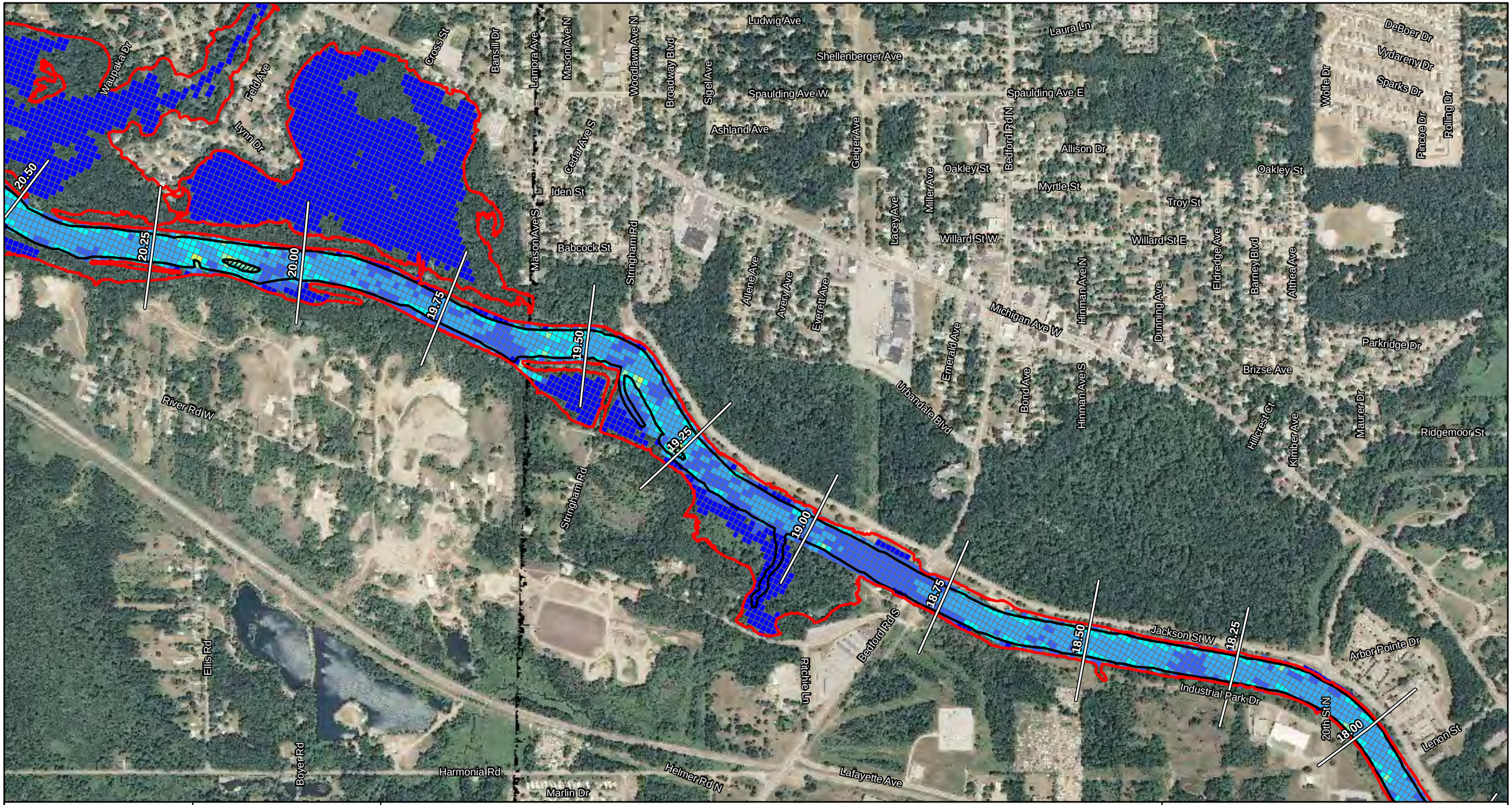
MP 16.00 - MP 18.00

SHEET 7 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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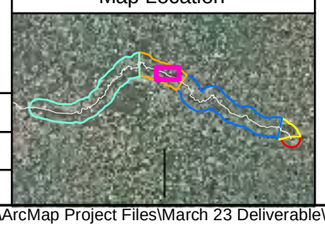
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 27, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

Channel Bankline
Island Bankline
HEC-RAS 100-Year Floodplain
Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

N

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 27, 2011

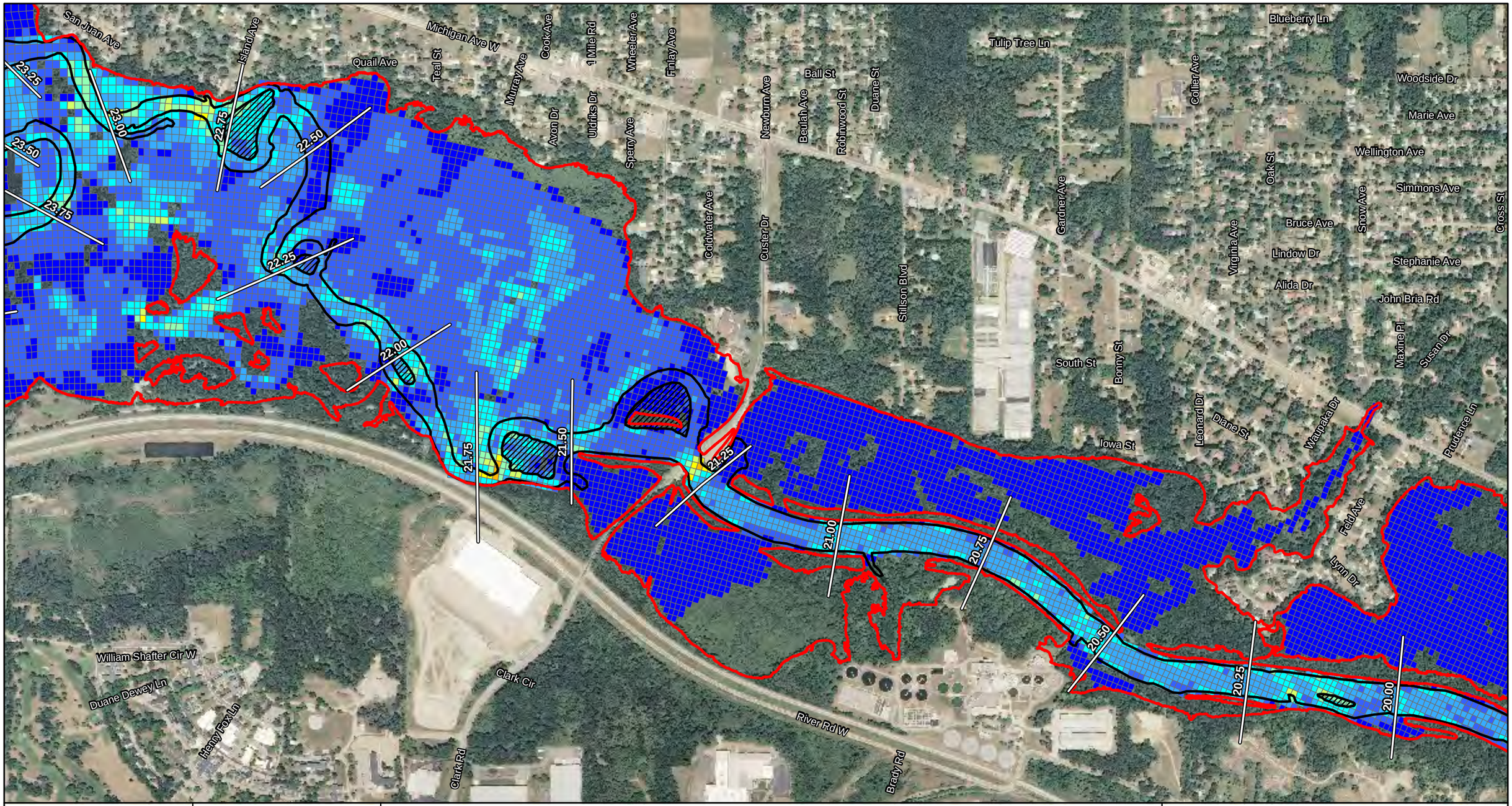
MP 18.00 - MP 20.00

SHEET 8 OF 16

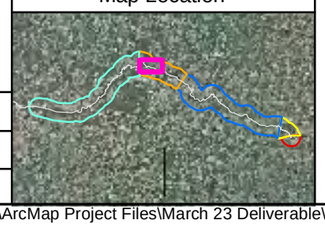
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_May27_2011.mxd

Aerial Photography Date: July & August 2009



Map Location



Legend

Bed Shear Stress (Pa), May 27, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
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- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

N

0 400 800 1,600
Scale in Feet

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 27, 2011

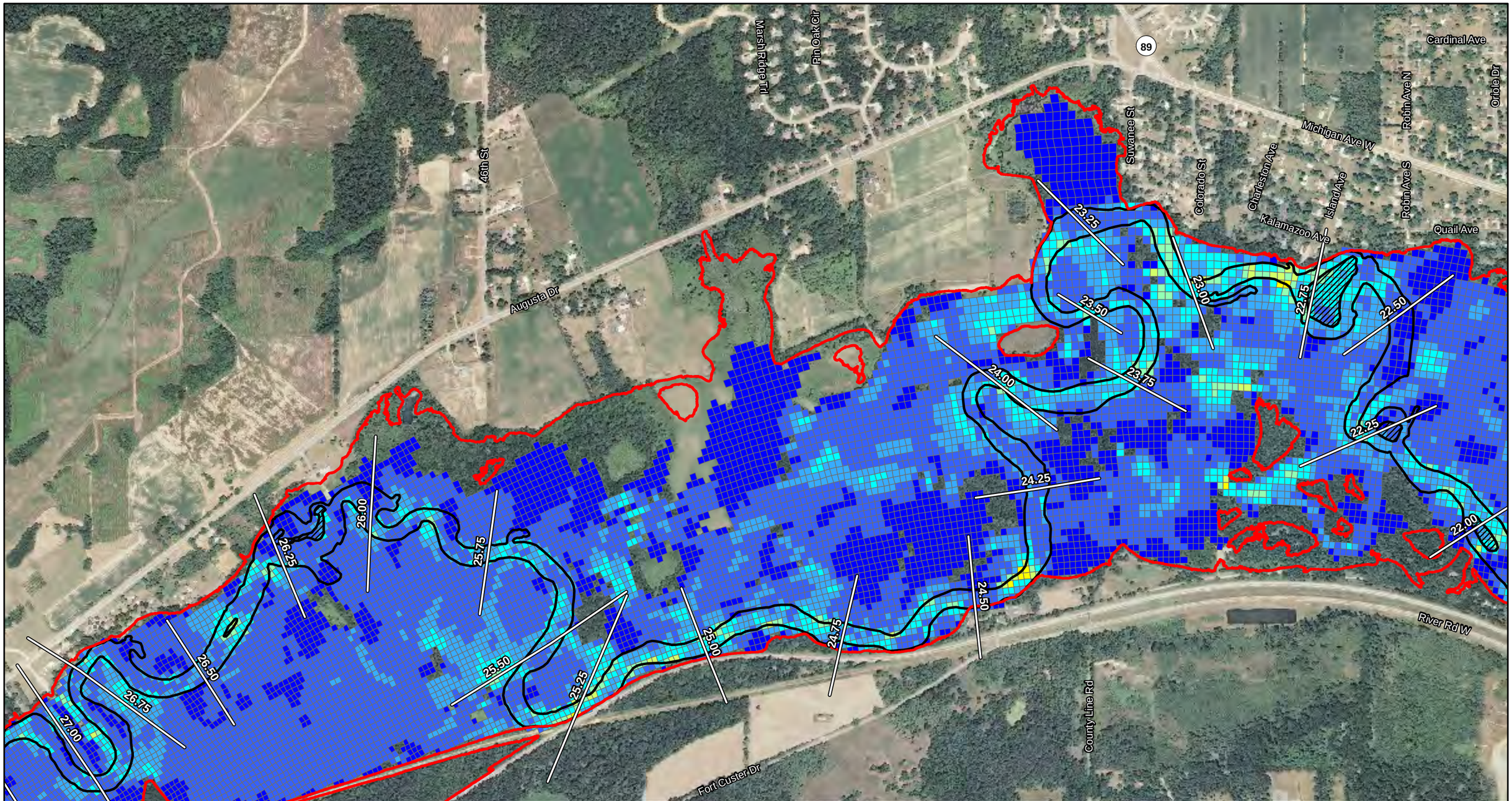
MP 20.00 - MP 22.50

SHEET 9 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_May27_2011.mxd

Aerial Photography Date: July & August 2009



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 27, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 27, 2011

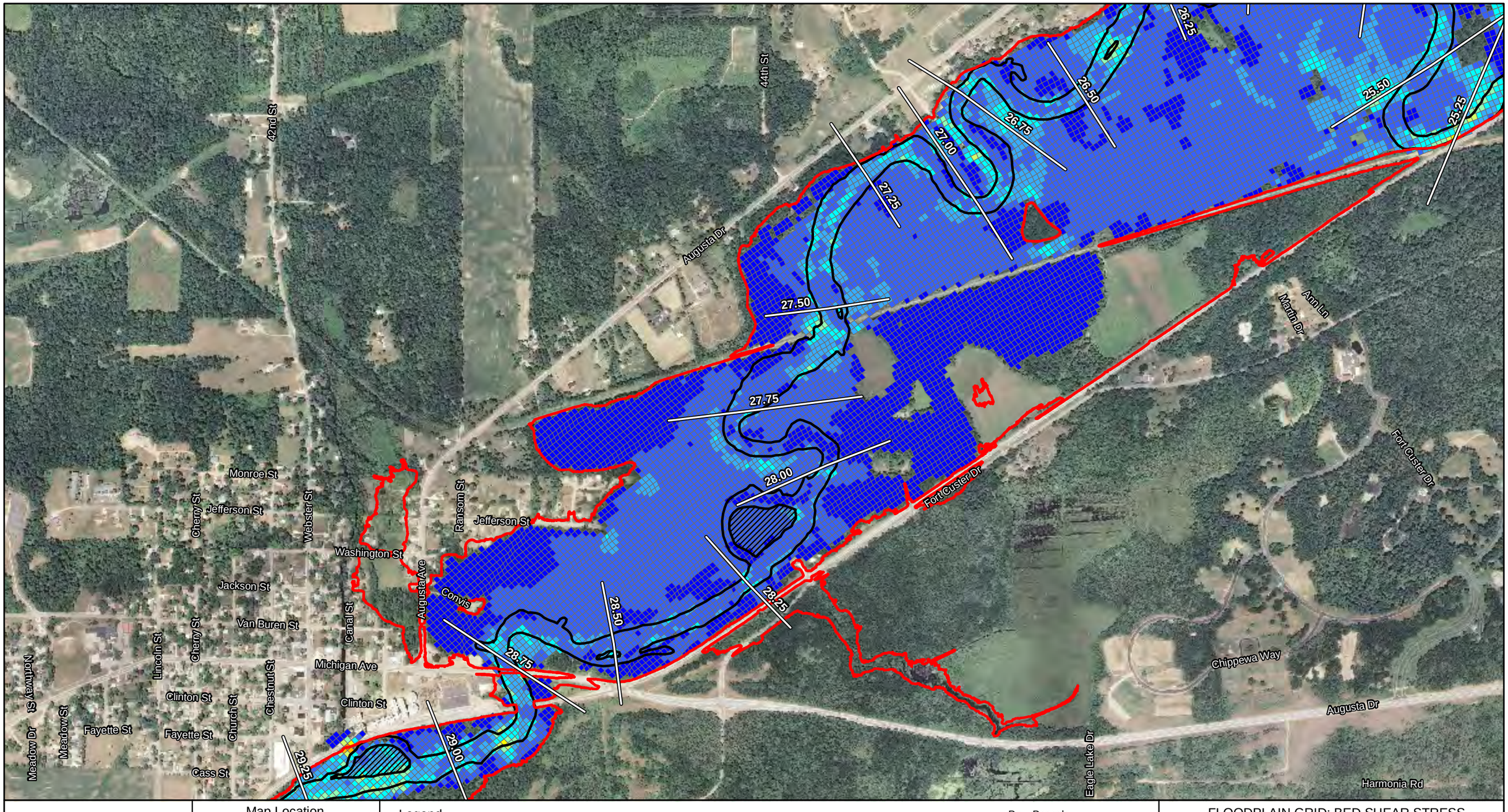
MP 22.50 - MP 27.00

SHEET 10 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_May27_2011.mxd

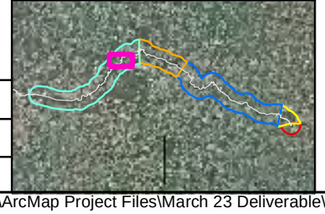
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 27, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
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- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

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cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 27, 2011

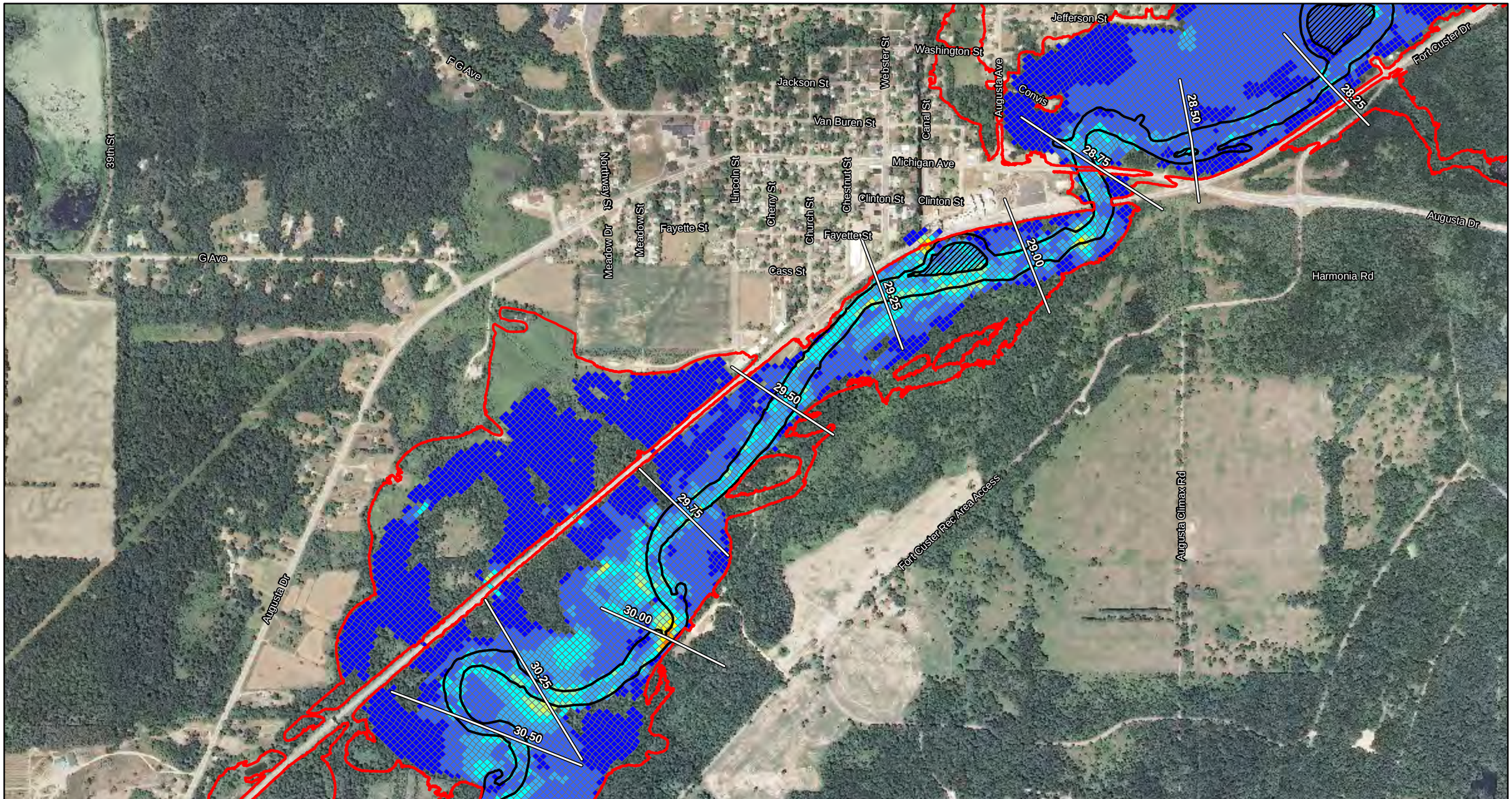
MP 27.00 - MP 28.75

SHEET 11 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 27, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 27, 2011

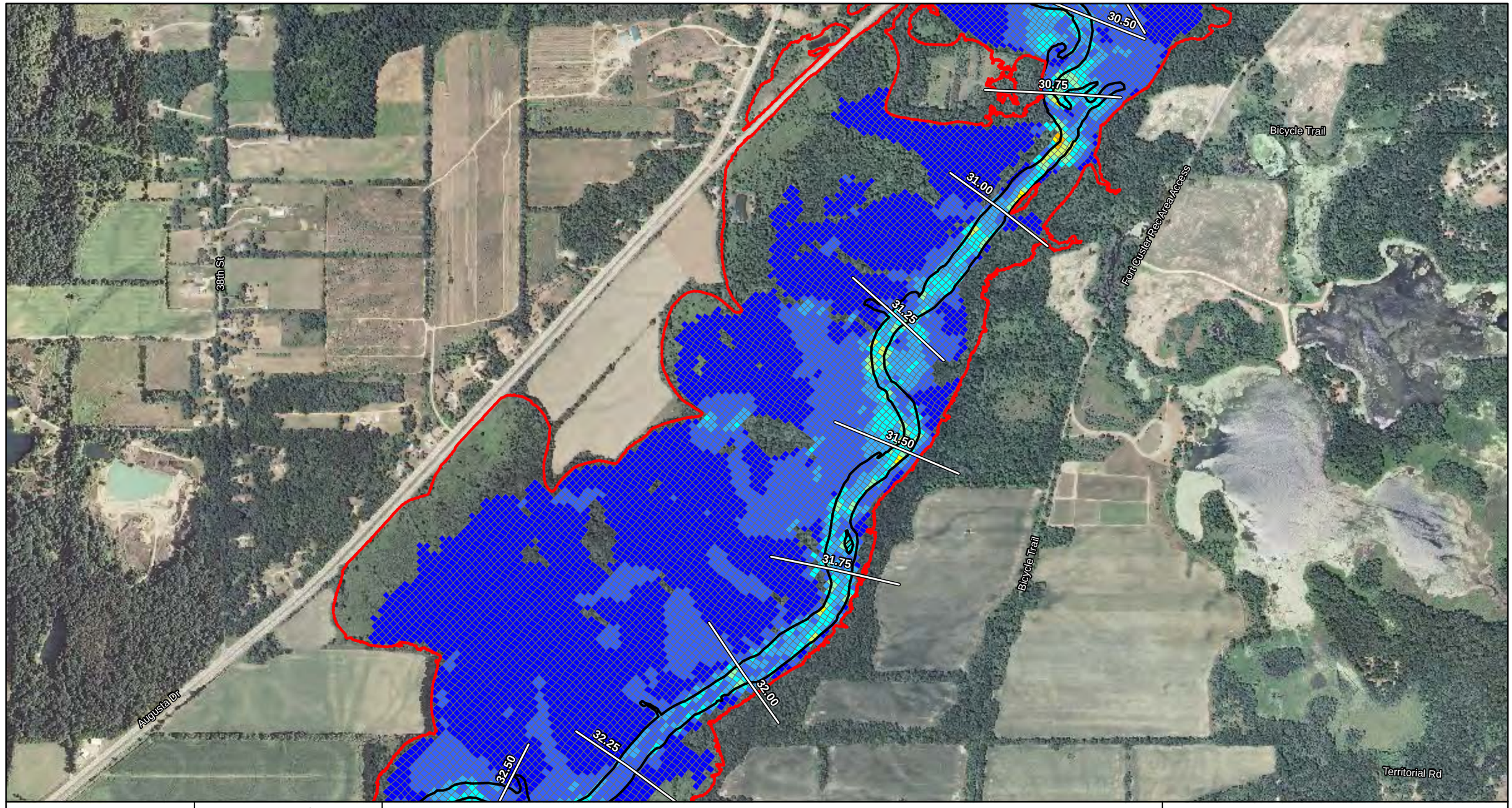
MP 28.75 - MP 30.50

SHEET 12 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_May27_2011.mxd

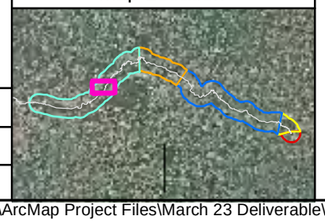
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 27, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
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- Channel Bankline
- Island Bankline
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- Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 27, 2011

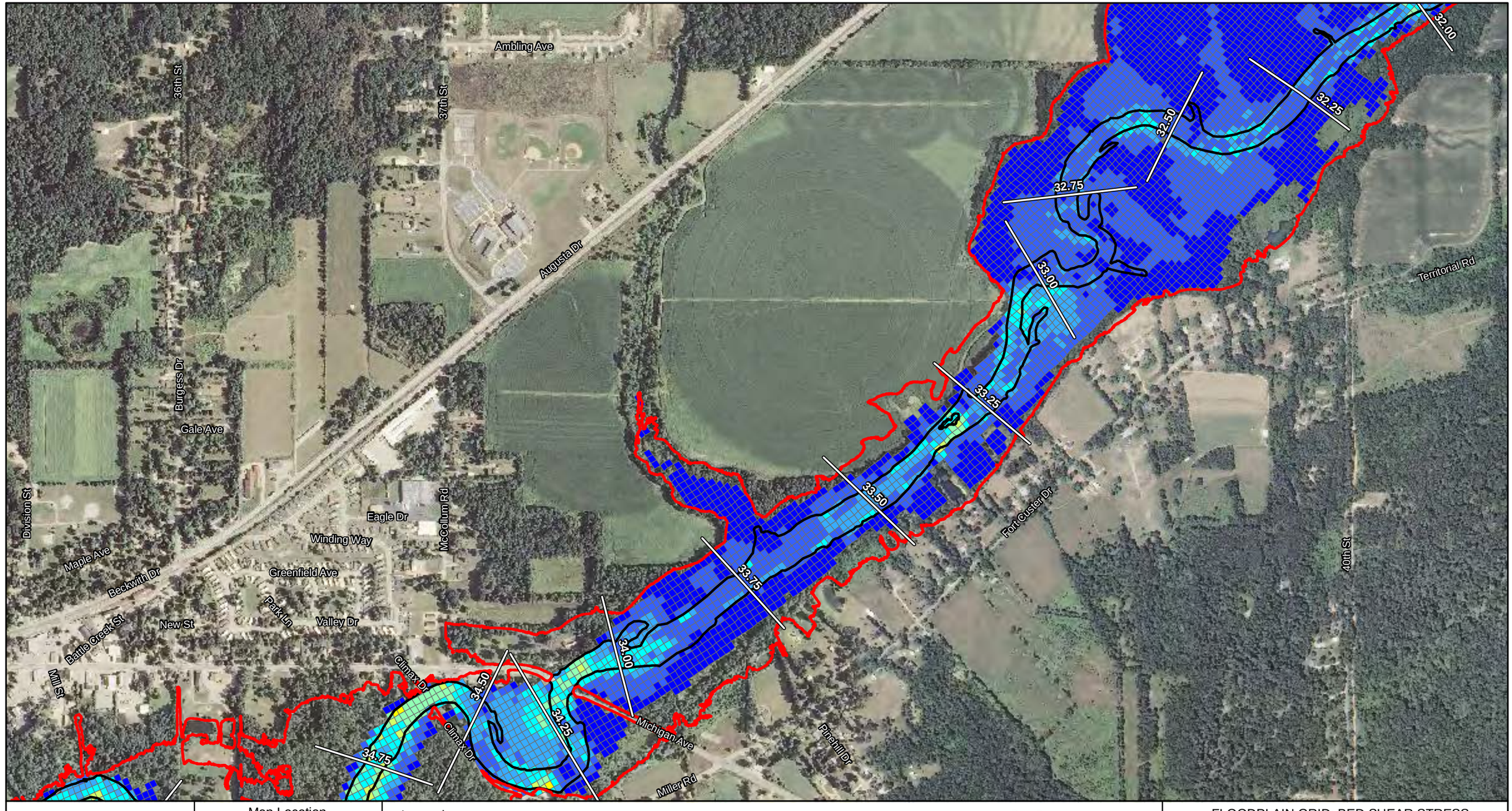
MP 30.50 - MP 32.25

SHEET 13 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_May27_2011.mxd

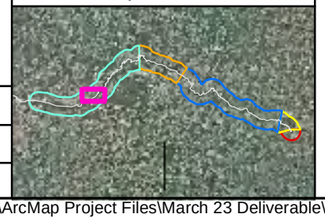
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 27, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 27, 2011

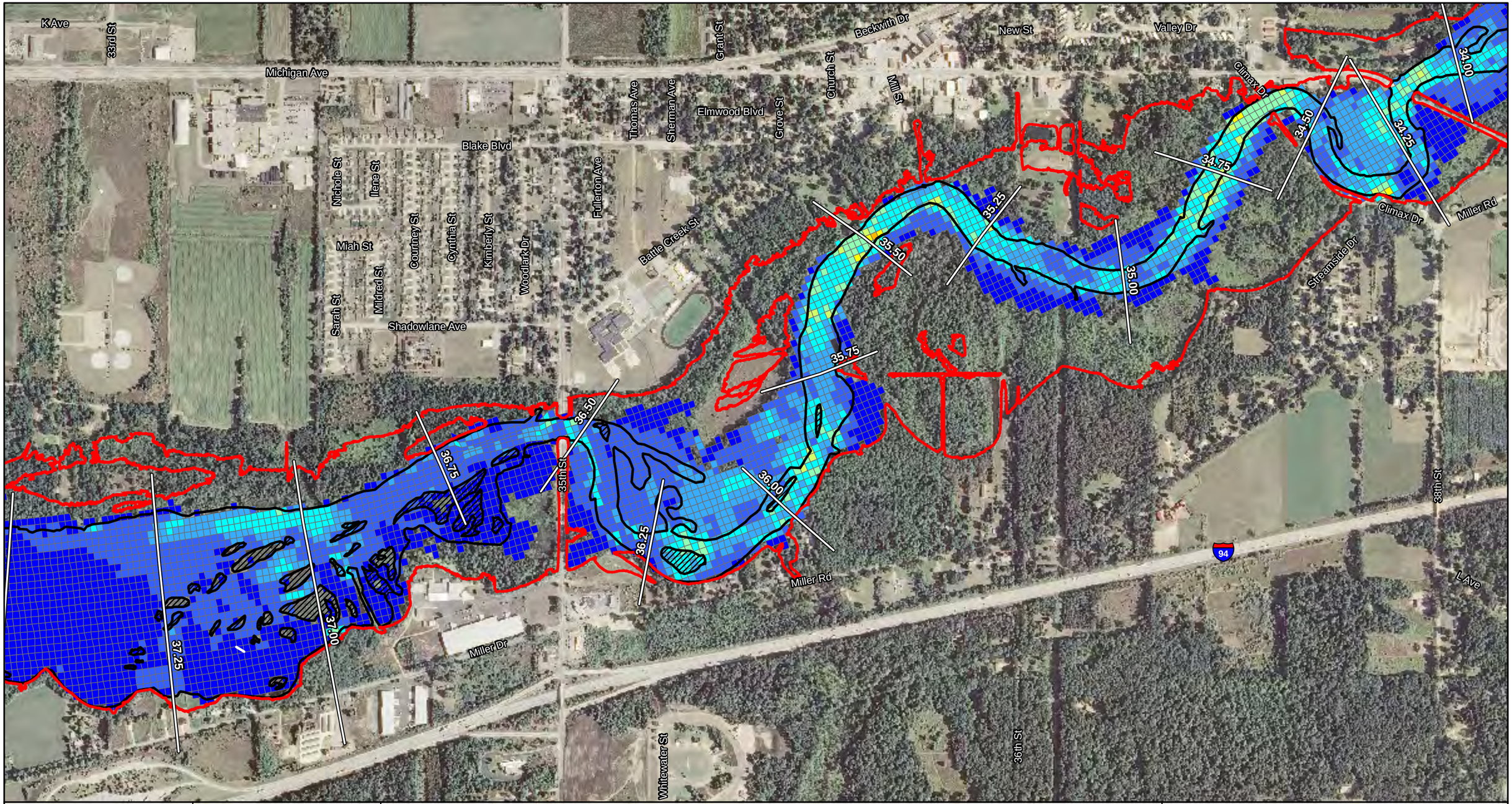
MP 32.25 - MP 34.75

SHEET 14 OF 16

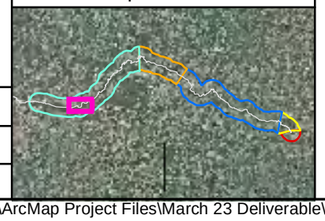
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



Map Location



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Legend

Bed Shear Stress (Pa), May 27, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

Channel Bankline
Island Bankline
HEC-RAS 100-Year Floodplain
Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 27, 2011

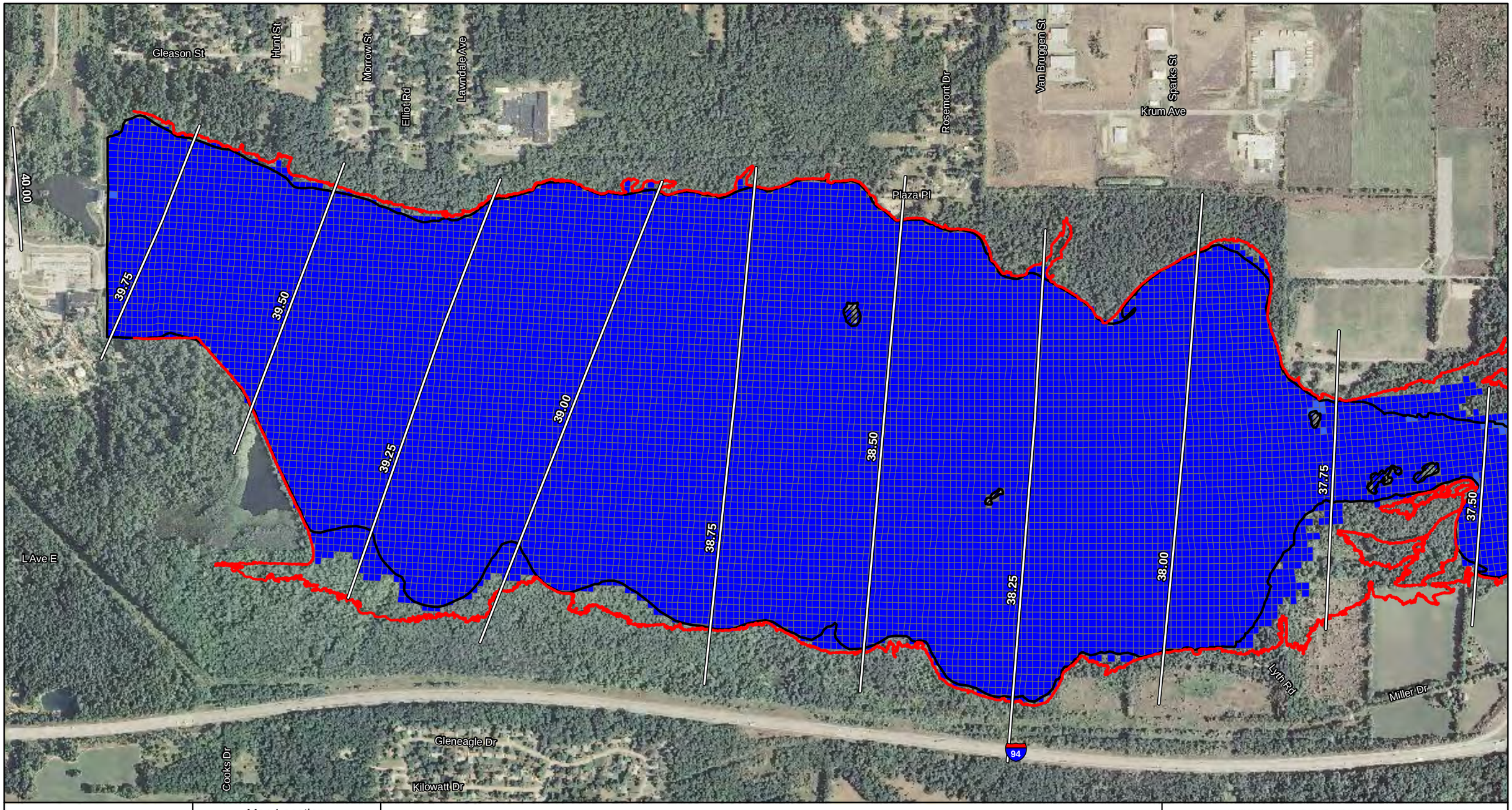
MP 34.25 - MP 37.50

SHEET 15 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_May27_2011.mxd

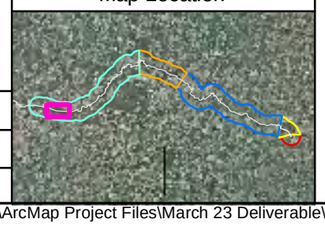
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 27, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
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- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 2,720 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 27, 2011

MP 37.50 - MP 40.00

SHEET 16 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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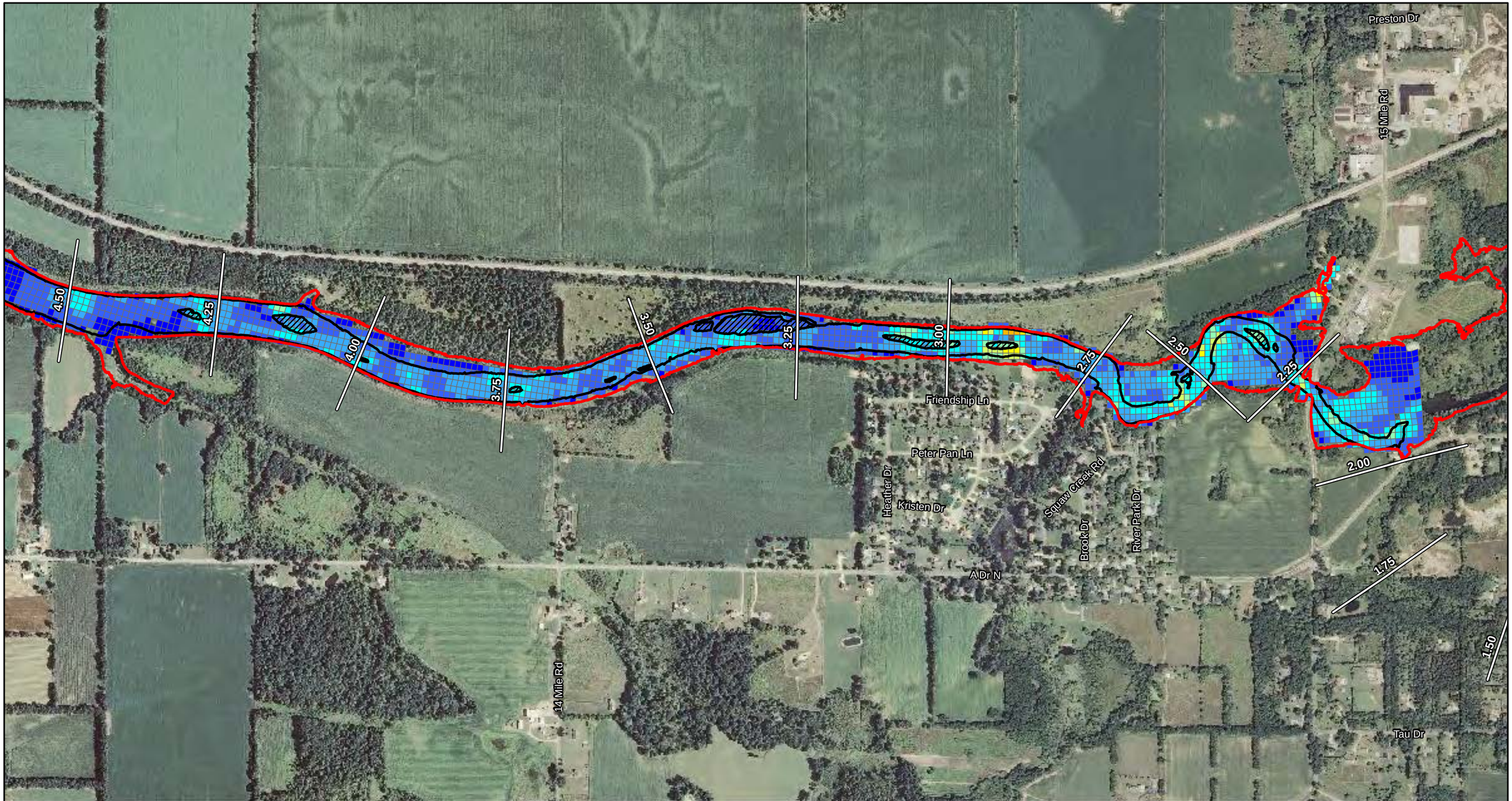
Aerial Photography Date: July & August 2009

Figure 5-19

Floodplain Grid: Bed Shear Stress

May 28, 2011

Sheets 1 through 16



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 28, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
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- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascal
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 28, 2011

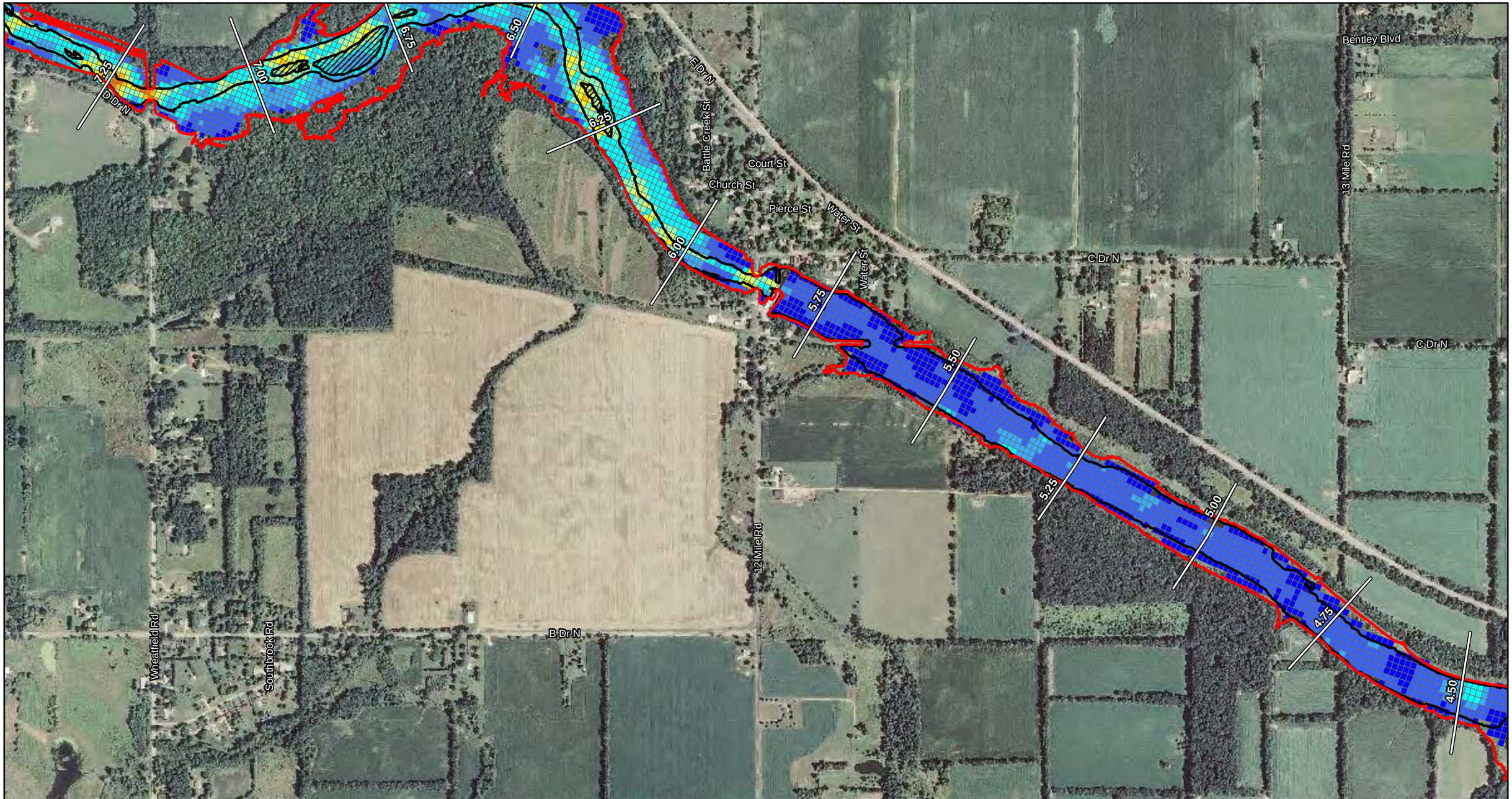
MP 1.50 - MP 4.50

SHEET 1 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_May28_2011.mxd

Aerial Photography Date: July & August 2009



Map Location



Legend

Bed Shear Stress (Pa), May 28, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascal
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

N

0 400 800 1,600
Scale in Feet

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 28, 2011

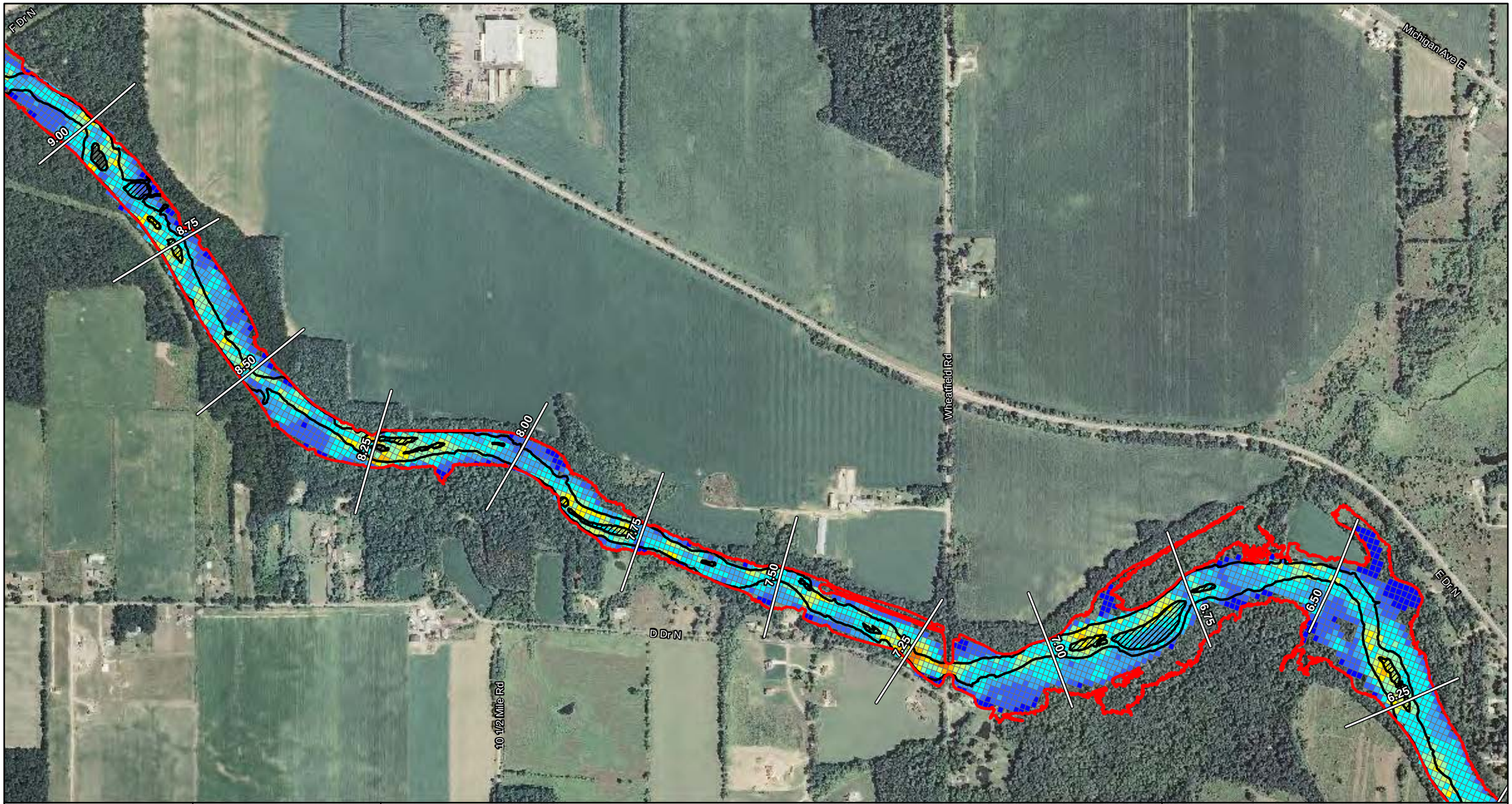
MP 4.50 - MP 6.25

SHEET 2 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_May28_2011.mxd

Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 28, 2011

- < 1.000001
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Pa = Pascal
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 28, 2011

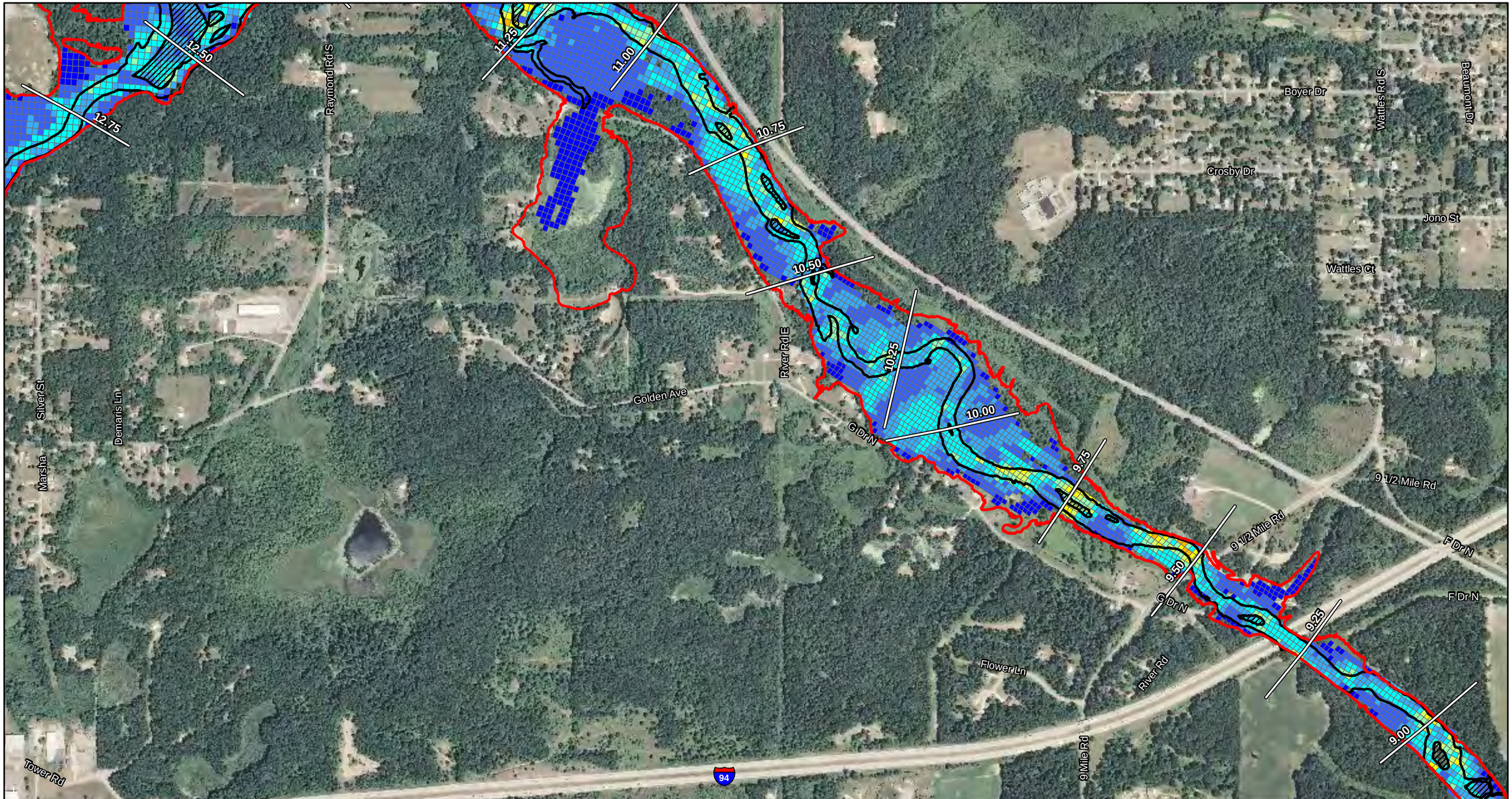
MP 6.25 - MP 9.00

SHEET 3 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_May28_2011.mxd

Aerial Photography Date: July & August 2009



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 28, 2011

- < 1.000001
- 1.000001 - 3.000000
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- Channel Bankline
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 28, 2011

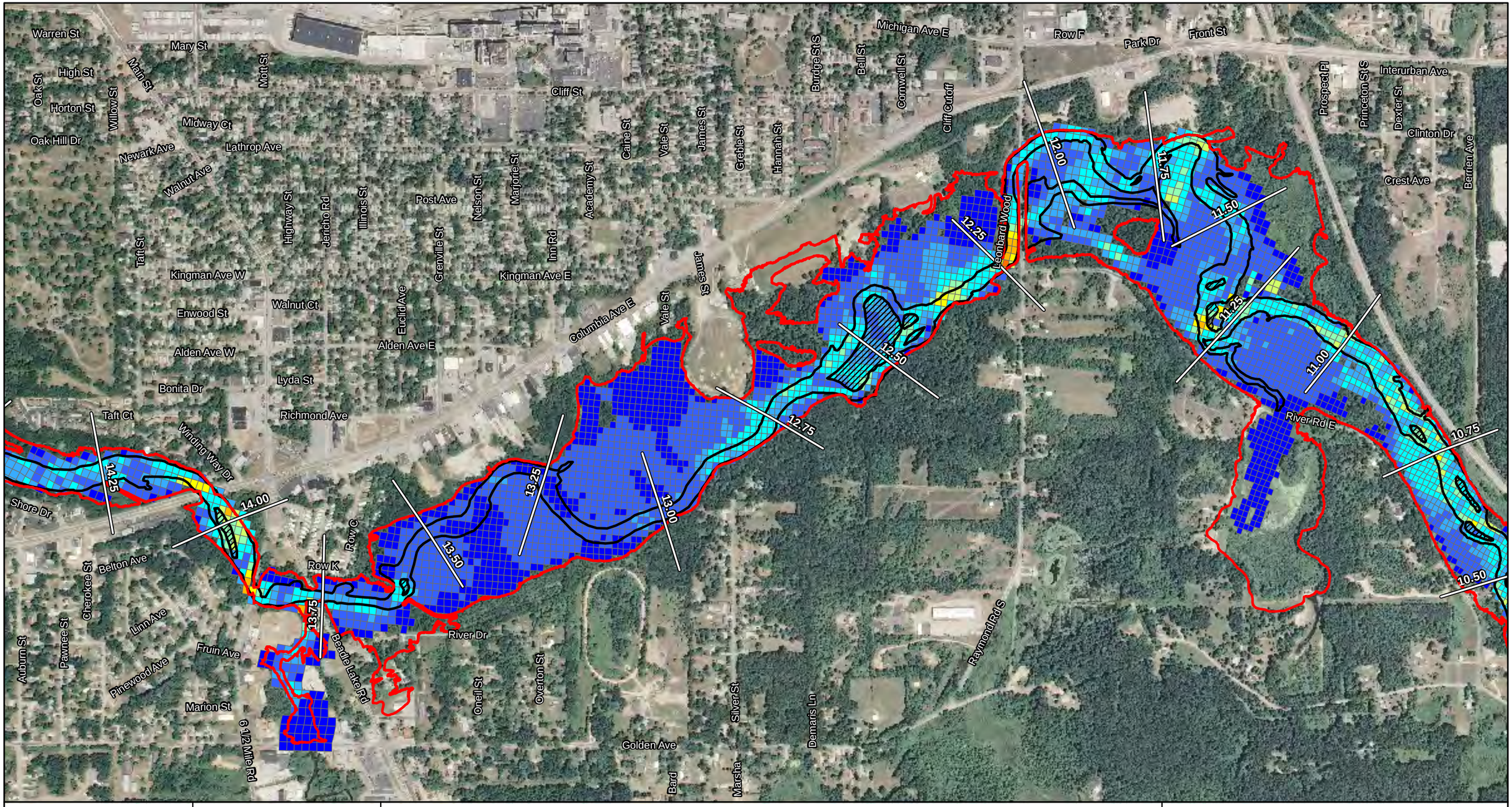
MP 9.00 - MP 10.50

SHEET 4 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_May28_2011.mxd

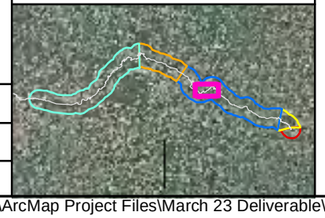
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 28, 2011

- < 1.000001
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 28, 2011

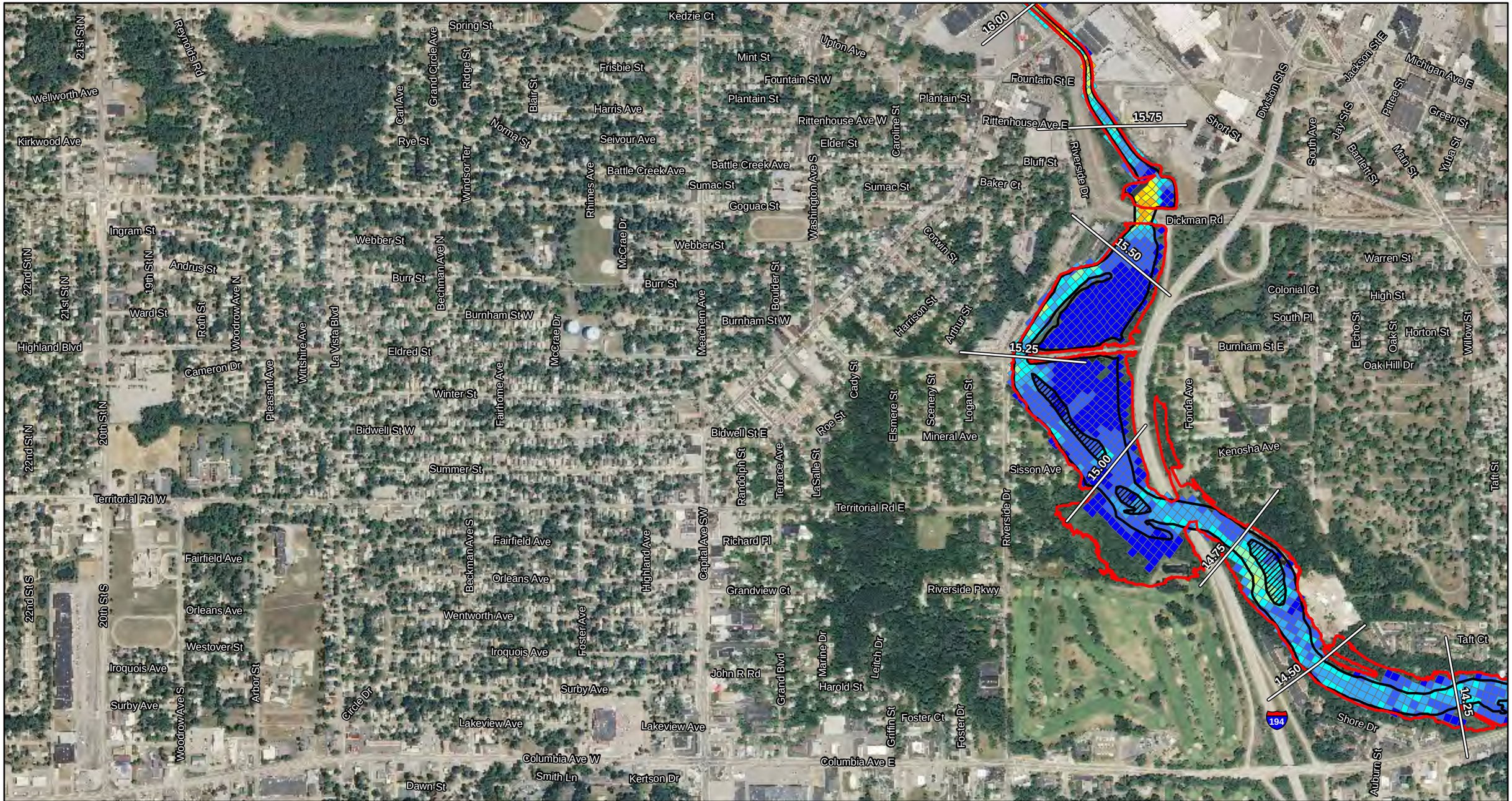
MP 10.50 - MP 14.25

SHEET 5 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 28, 2011

- < 1.000001
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 28, 2011

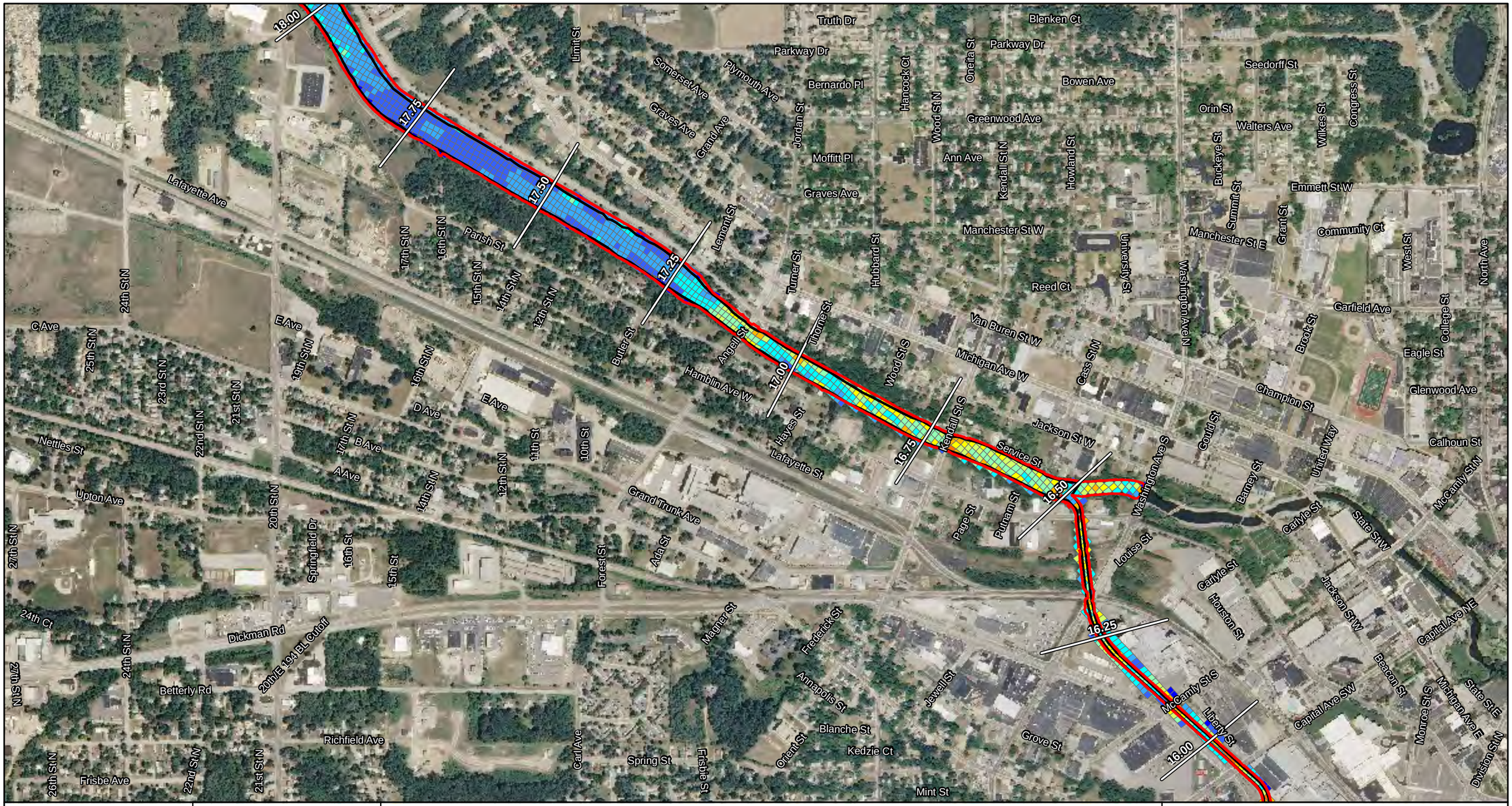
MP 14.25 - MP 16.00

SHEET 6 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

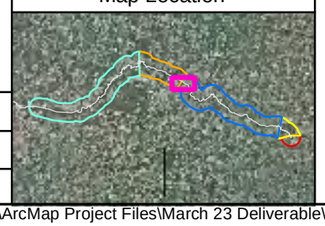
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_May28_2011.mxd

Aerial Photography Date: July & August 2009



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 28, 2011

- < 1.000001
- 1.000001 - 3.000000
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- Channel Bankline
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Pa = Pascal
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 28, 2011

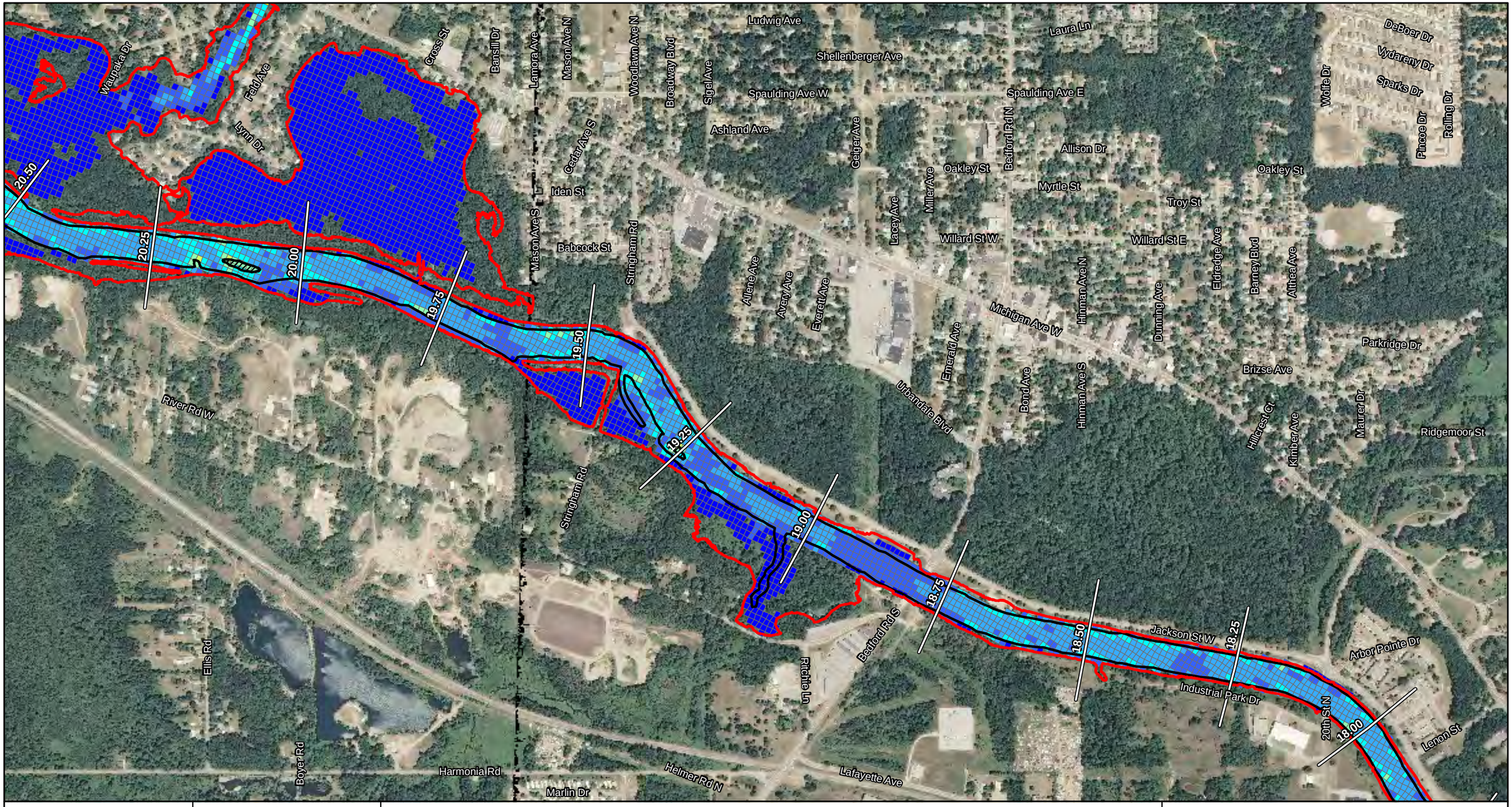
MP 16.00 - MP 18.00

SHEET 7 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_May28_2011.mxd

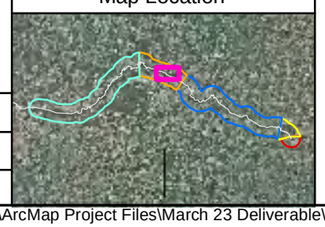
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 28, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

Channel Bankline
Island Bankline
HEC-RAS 100-Year Floodplain
Quarter Mile Grid Segment

Pa = Pascal
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 28, 2011

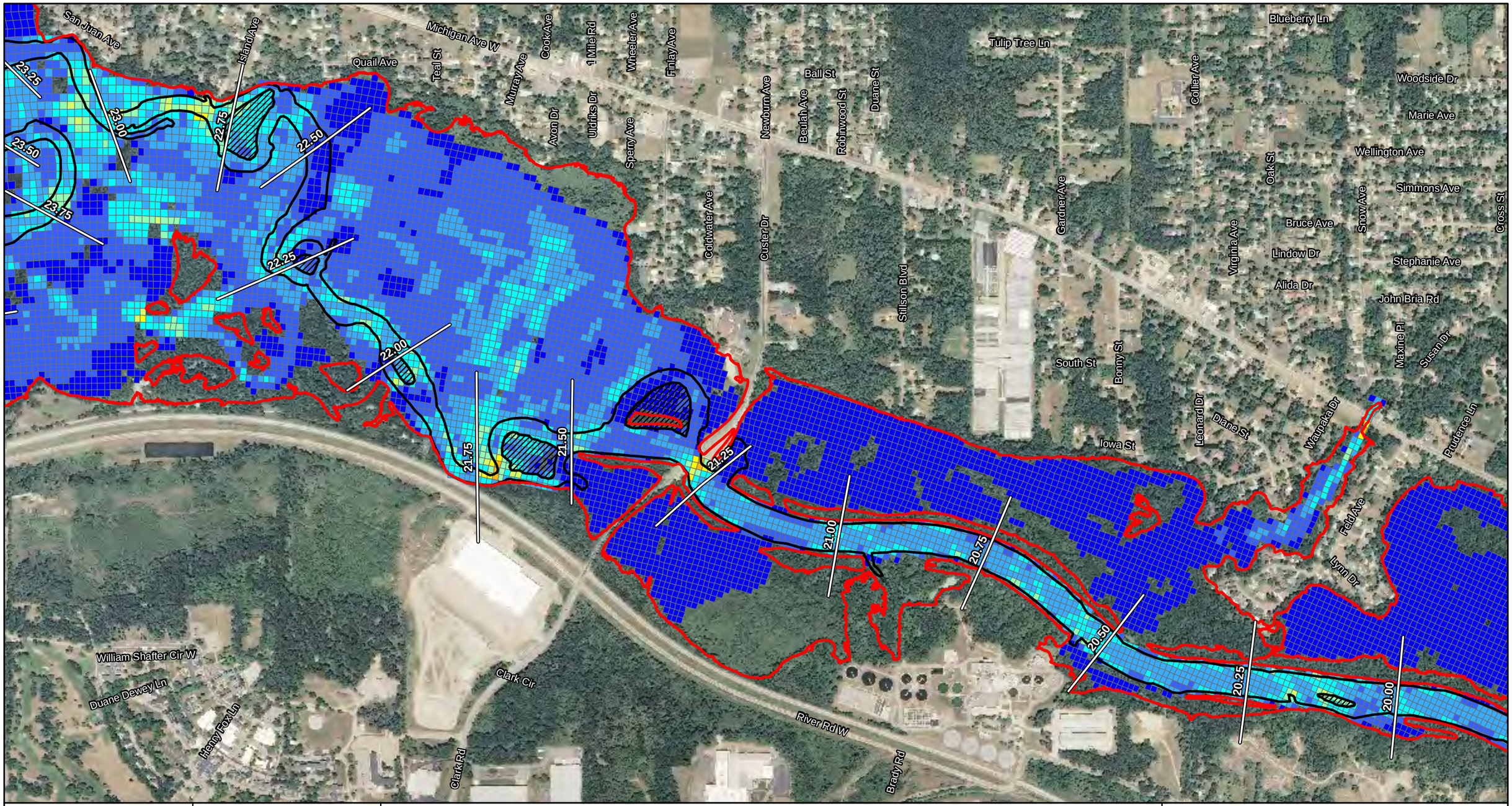
MP 18.00 - MP 20.00

SHEET 8 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_May28_2011.mxd

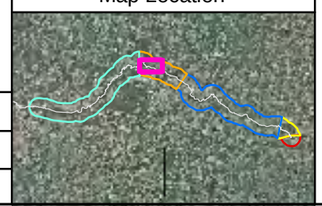
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 28, 2011

- < 1.000001
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N

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Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 28, 2011

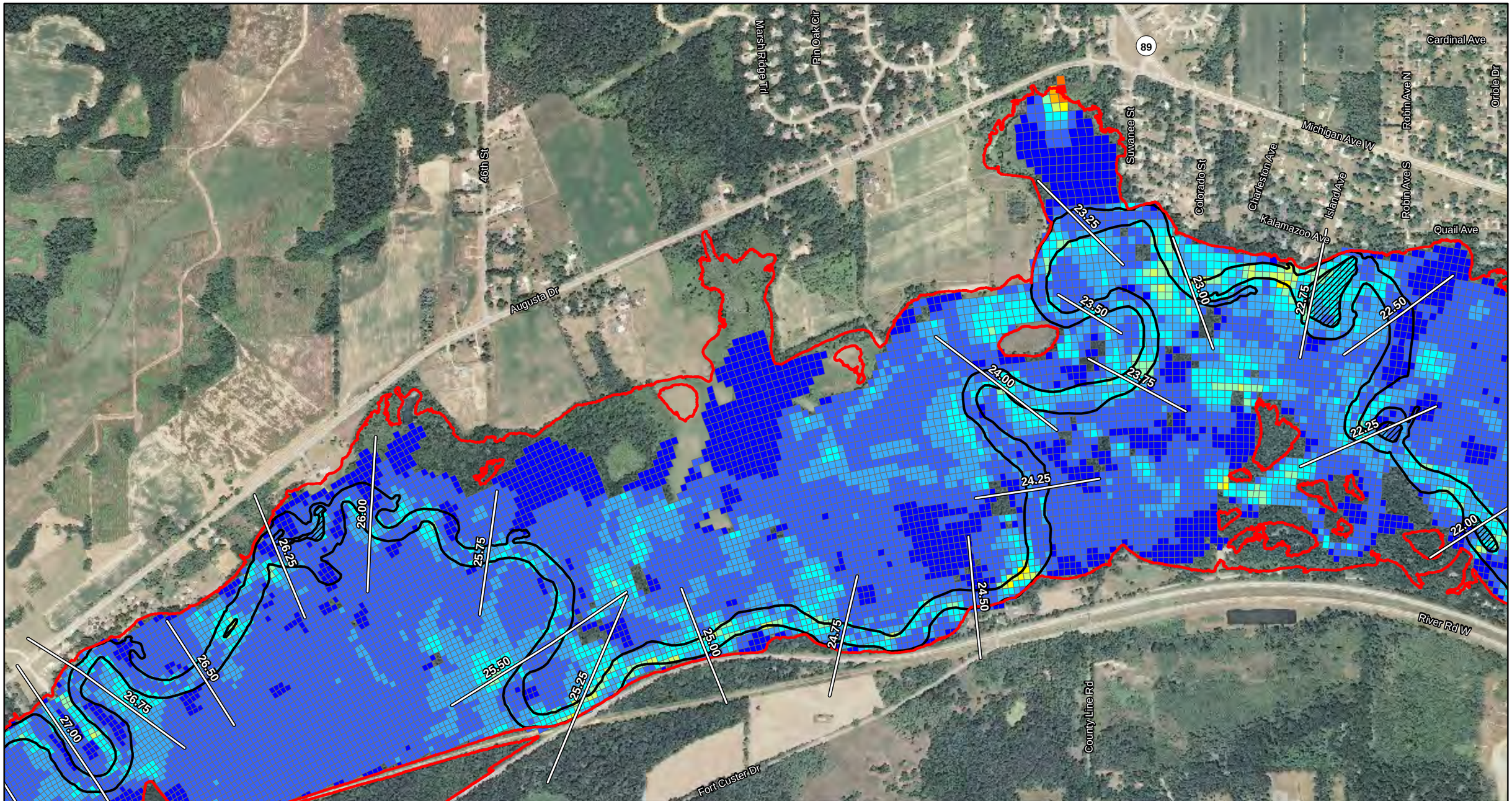
MP 20.00 - MP 22.50

SHEET 9 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_May28_2011.mxd

Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 28, 2011

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- Channel Bankline
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N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 28, 2011

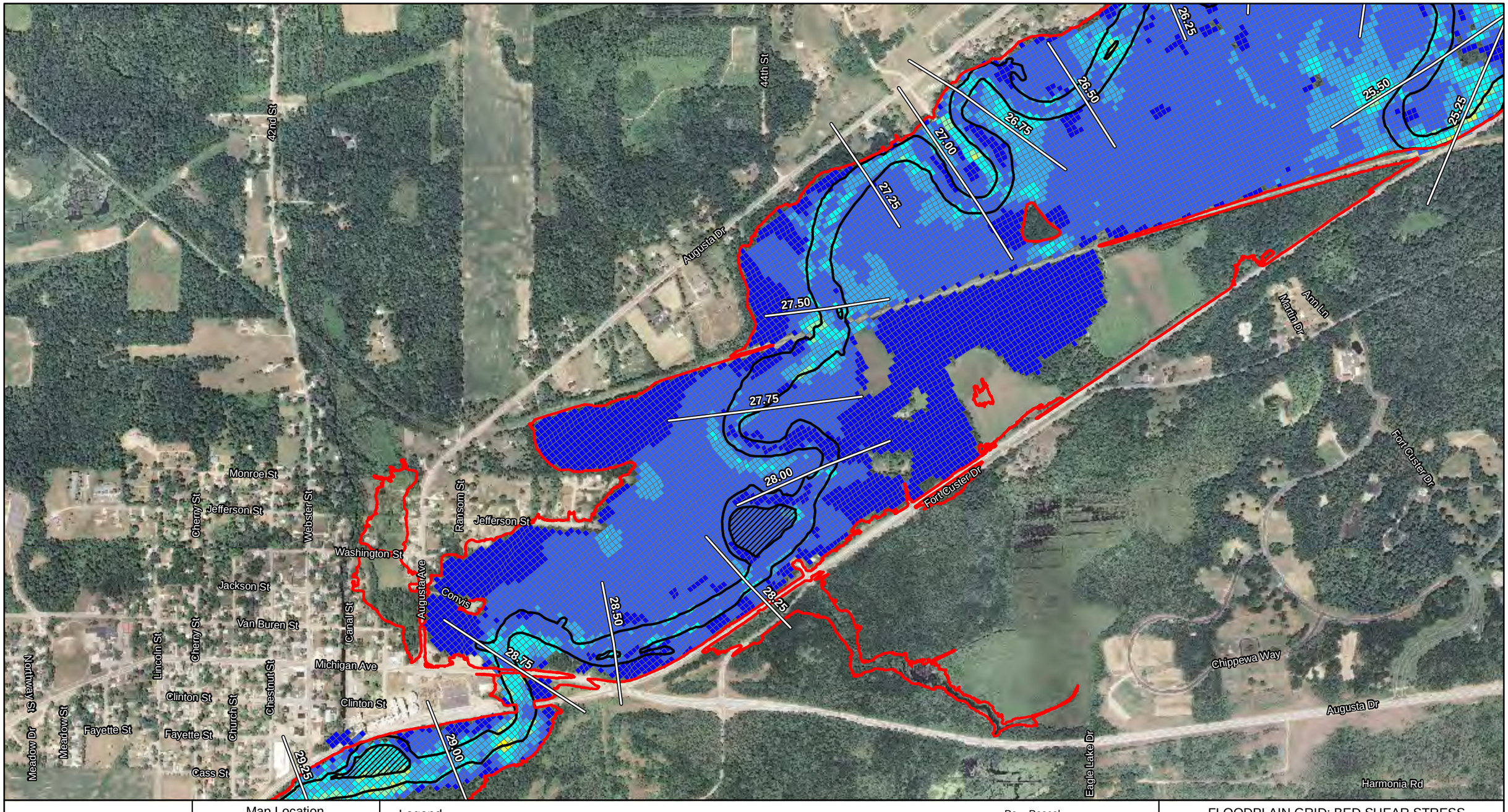
MP 22.50 - MP 27.00

SHEET 10 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_May28_2011.mxd

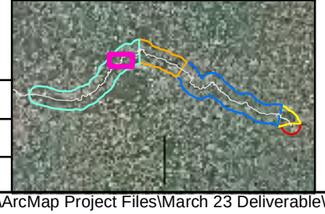
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 28, 2011

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Channel Bankline
Island Bankline
HEC-RAS 100-Year Floodplain
Quarter Mile Grid Segment

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Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 28, 2011

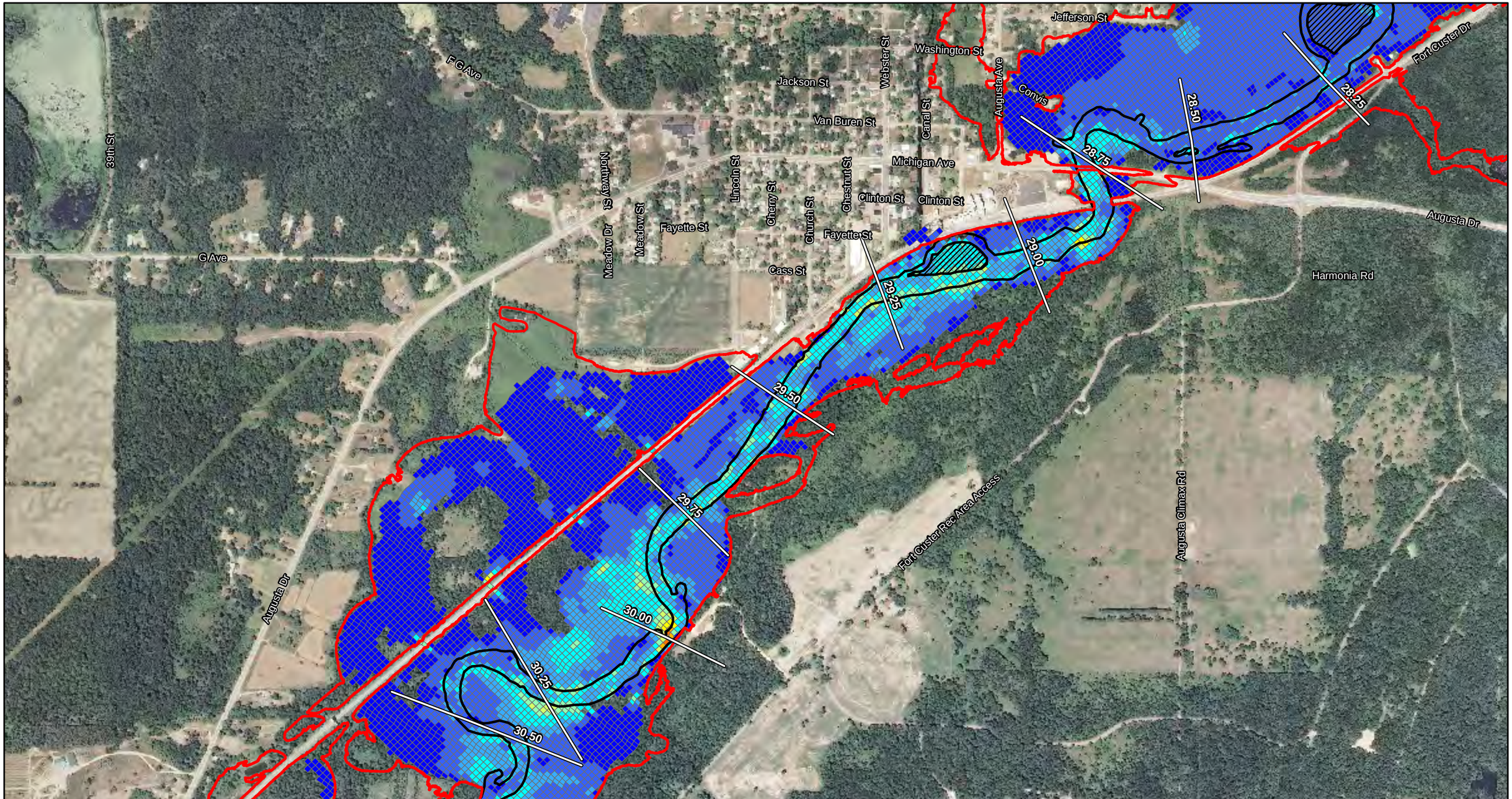
MP 27.00 - MP 28.75

SHEET 11 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), May 28, 2011

- < 1.000001
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- 10.000001 - 15.000000
- 15.000001 - 20.000000
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- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

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Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 28, 2011

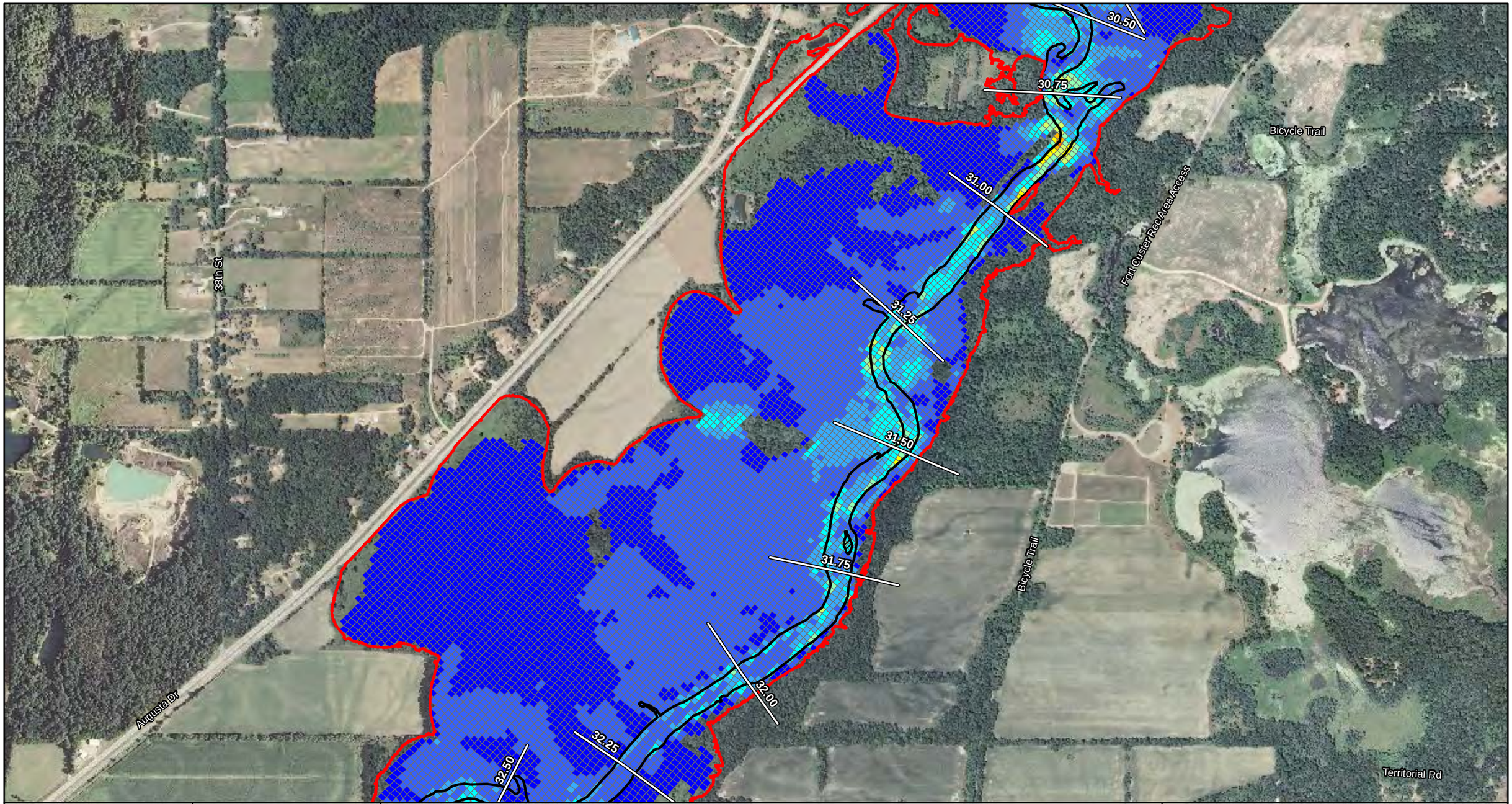
MP 28.75 - MP 30.50

SHEET 12 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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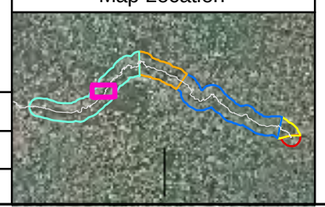
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 28, 2011

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- Channel Bankline
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- Quarter Mile Grid Segment

Pa = Pascal
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 28, 2011

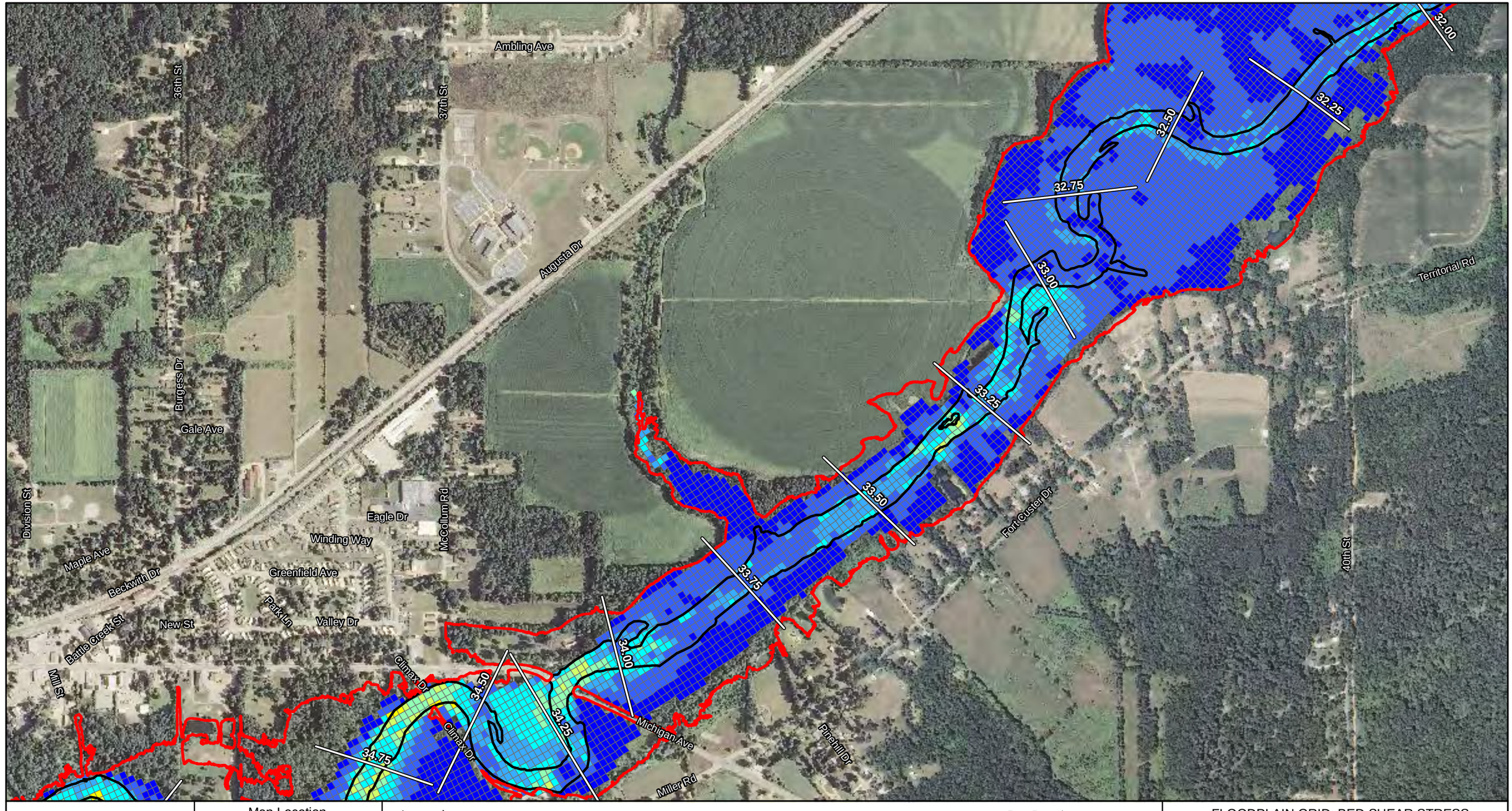
MP 30.50 - MP 32.25

SHEET 13 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_May28_2011.mxd

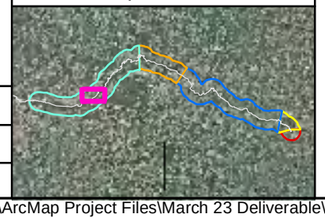
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 28, 2011

- < 1.000001
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- 20.000001 - 30.000000
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- Channel Bankline
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- Quarter Mile Grid Segment

Pa = Pascal
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 28, 2011

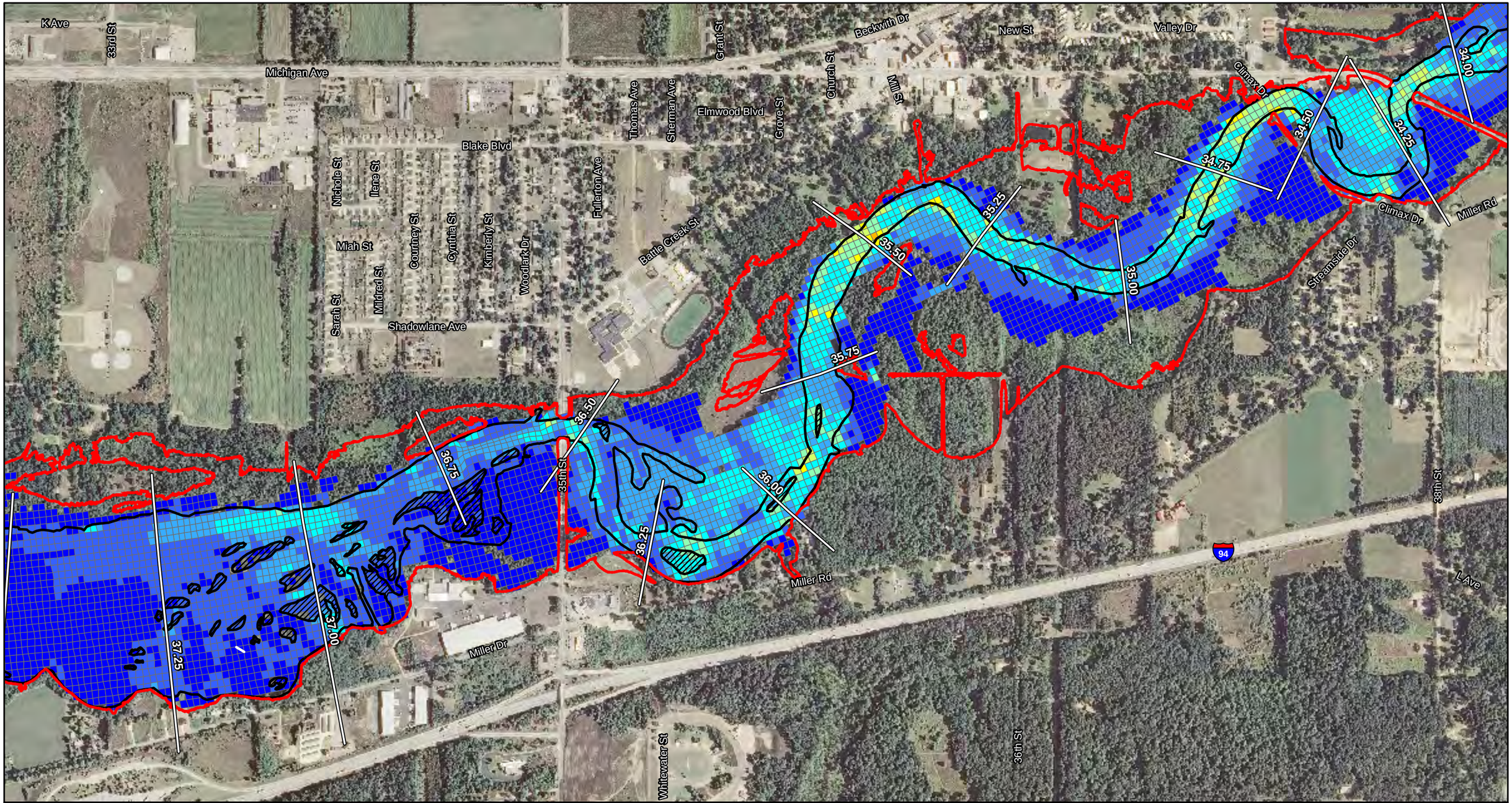
MP 32.25 - MP 34.75

SHEET 14 OF 16

ENBRIDGE LINE 6B MP 608
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ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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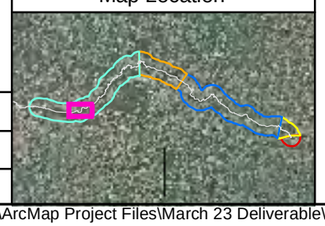
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 28, 2011

- < 1.000001
- 1.000001 - 3.000000
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- 5.000001 - 10.000000
- 10.000001 - 15.000000
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- 20.000001 - 30.000000
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- 50.000001 - 100.000000
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- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascal
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 28, 2011

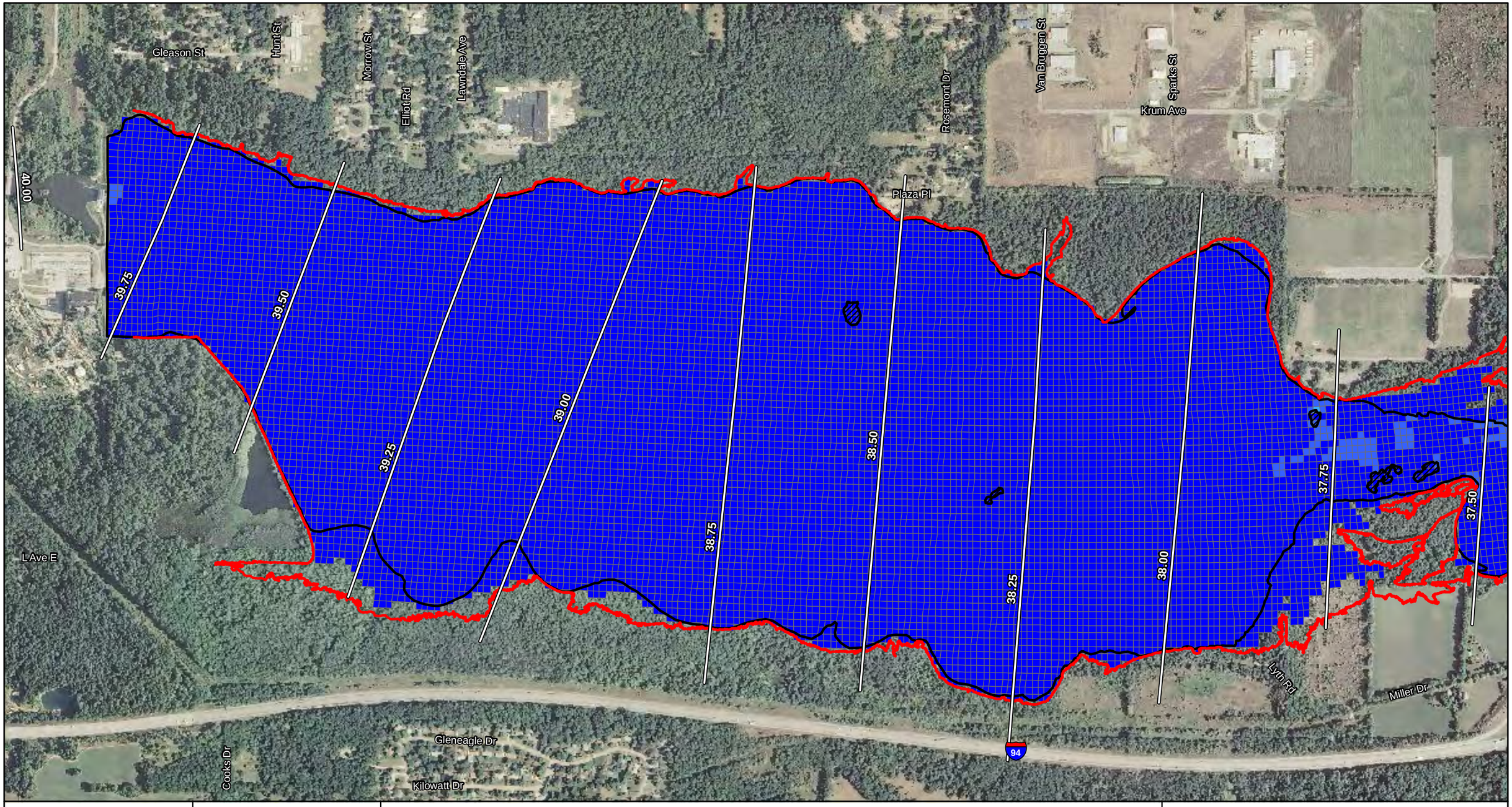
MP 34.25 - MP 37.50

SHEET 15 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_May28_2011.mxd

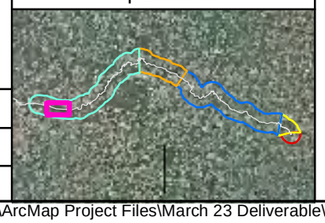
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), May 28, 2011

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Pa = Pascal
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 3,390 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
MAY 28, 2011

MP 37.50 - MP 40.00

SHEET 16 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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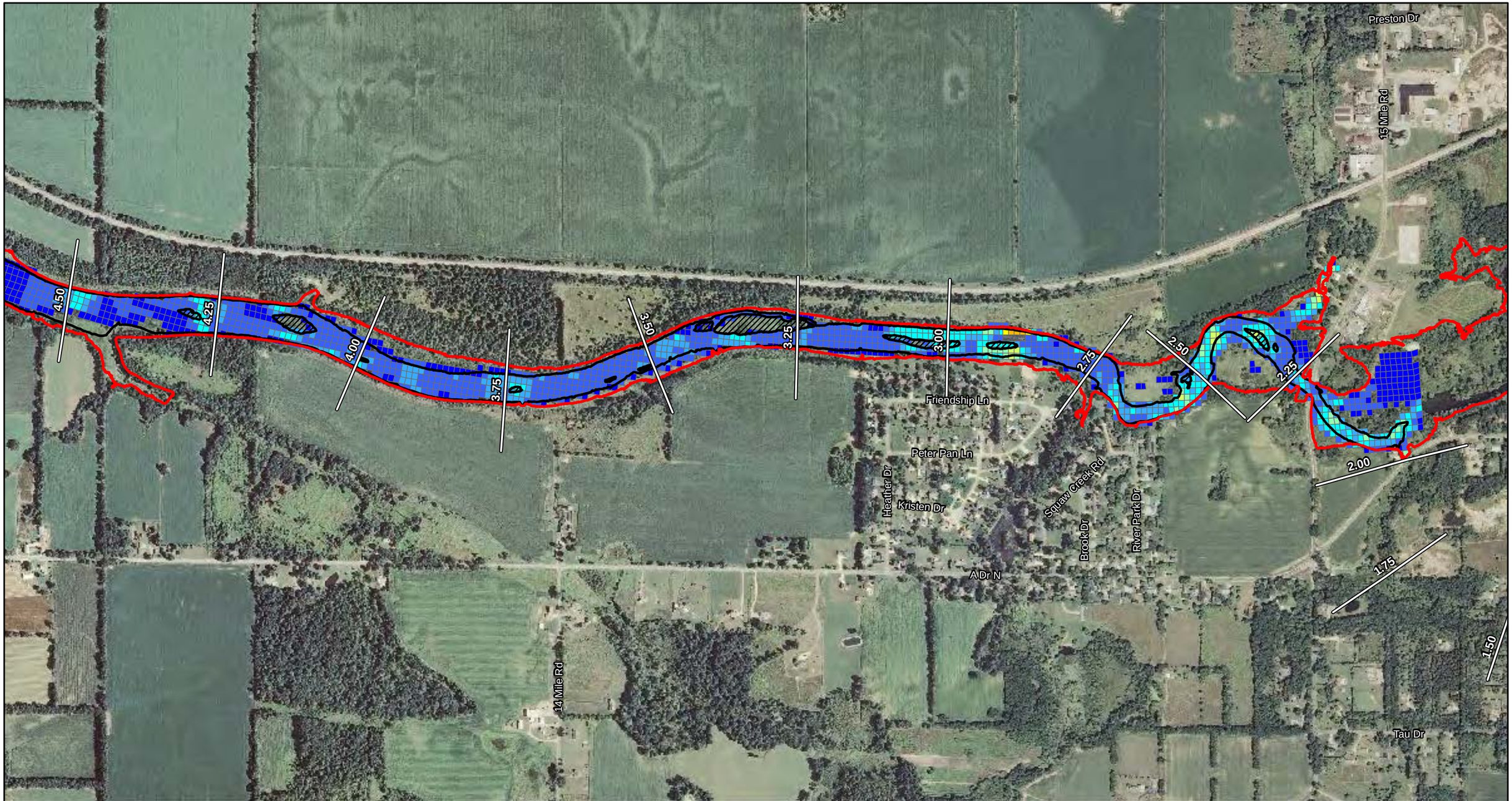
Aerial Photography Date: July & August 2009

Figure 5-20

Floodplain Grid: Bed Shear Stress

June 3, 2011

Sheets 1 through 16



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), June 3, 2011

- < 1.000001
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- Channel Bankline
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- Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
JUNE 3, 2011

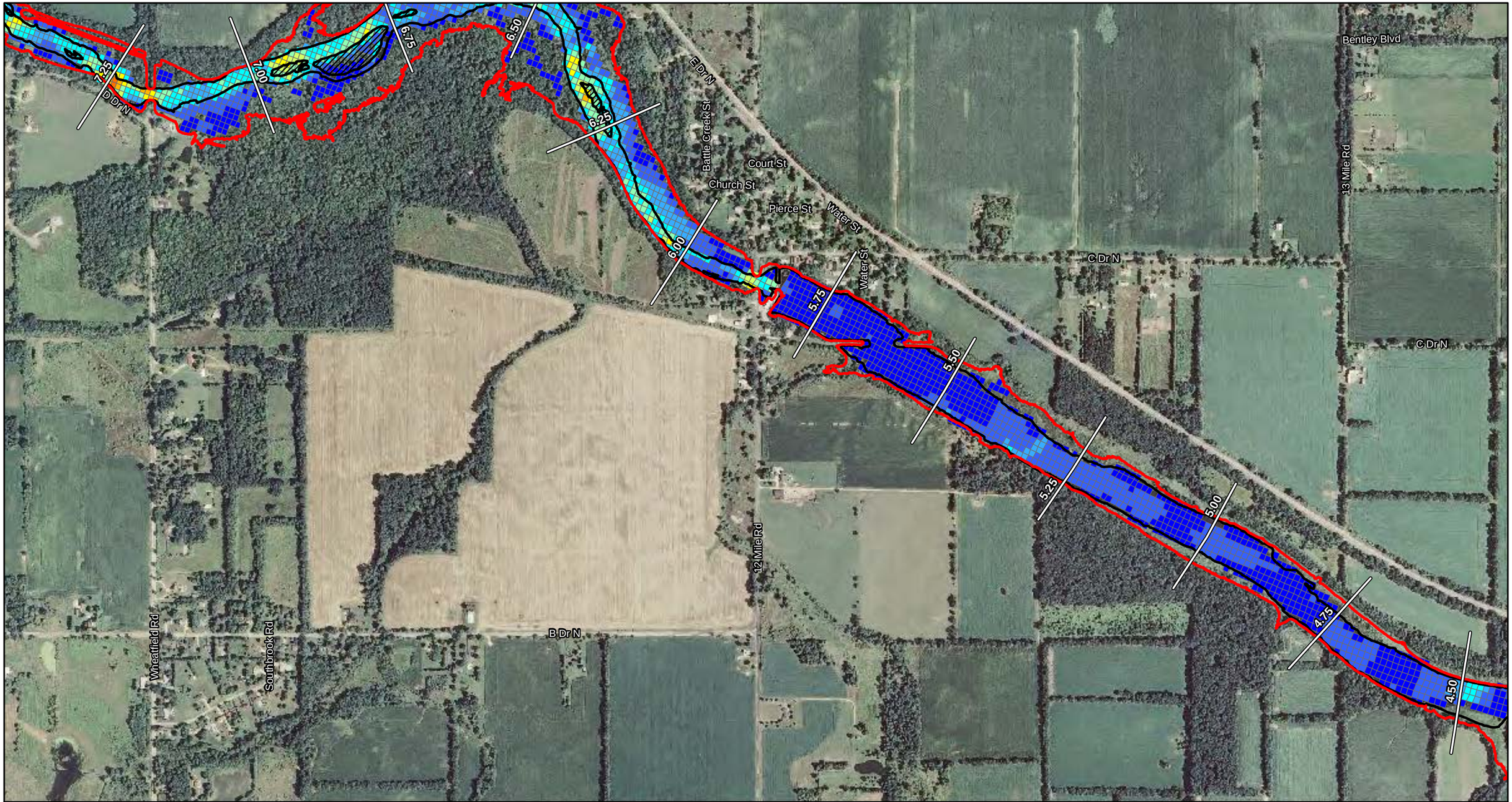
MP 1.50 - MP 4.50

SHEET 1 OF 16

ENBRIDGE LINE 6B MP 608
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Aerial Photography Date: July & August 2009



Map Location



Legend

Bed Shear Stress (Pa), June 3, 2011

- < 1.000001
- 1.000001 - 3.000000
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Scale in Feet

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

FLOODPLAIN GRID: BED SHEAR STRESS
JUNE 3, 2011

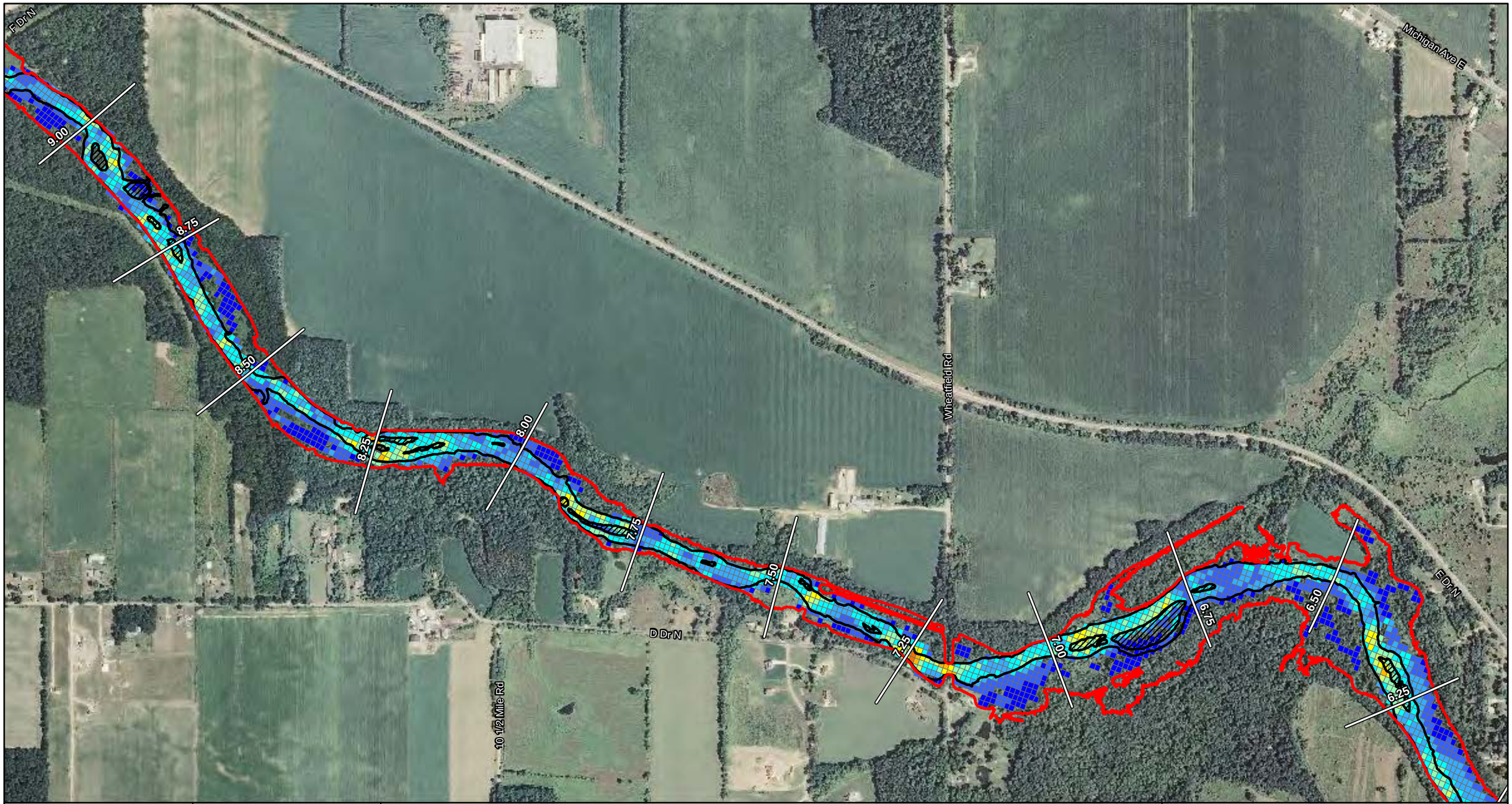
MP 4.50 - MP 6.25

SHEET 2 OF 16

ENBRIDGE LINE 6B MP 608
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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), June 3, 2011

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Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
JUNE 3, 2011

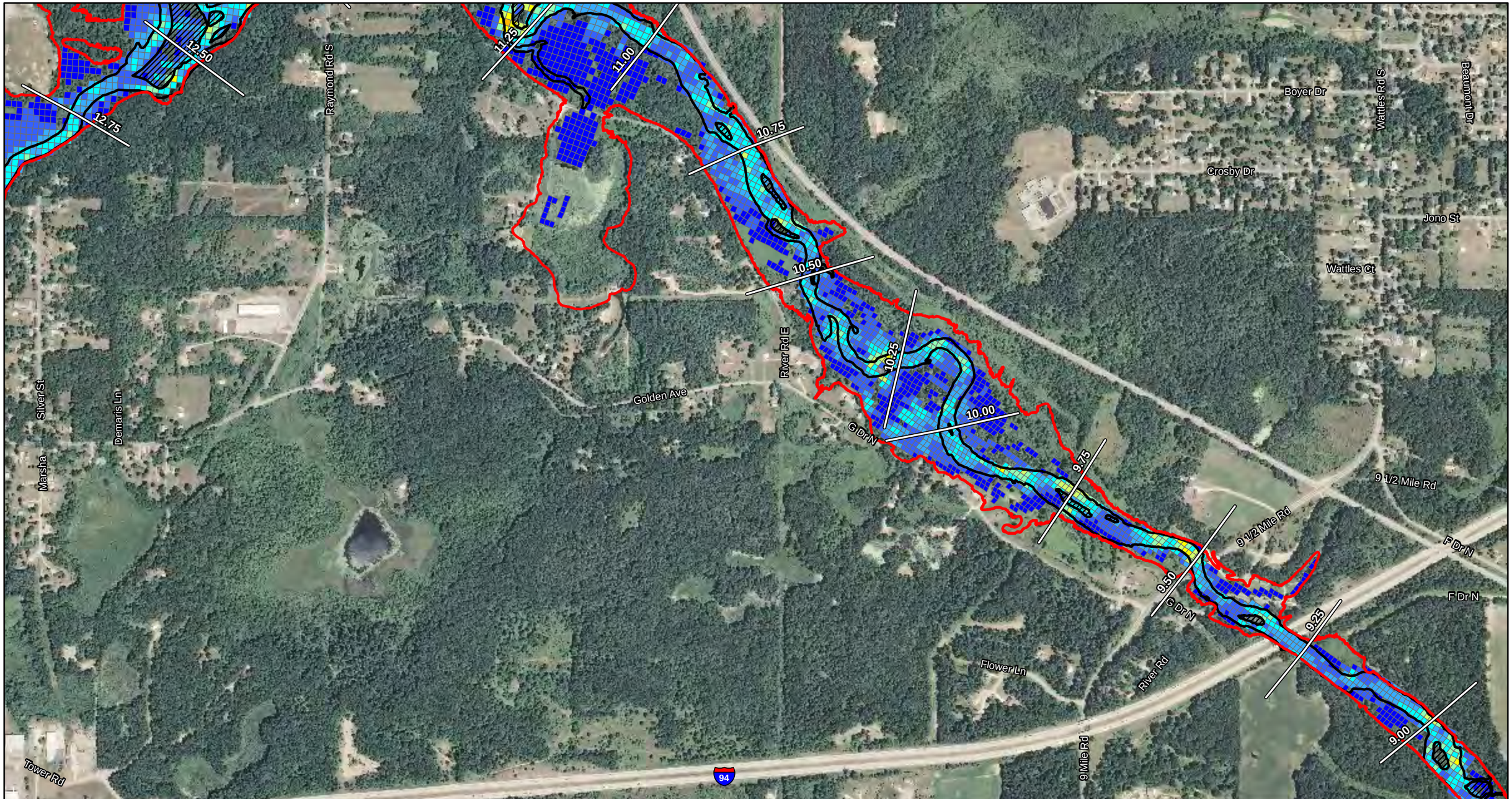
MP 6.25 - MP 9.00

SHEET 3 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

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Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), June 3, 2011

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Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

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0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
JUNE 3, 2011

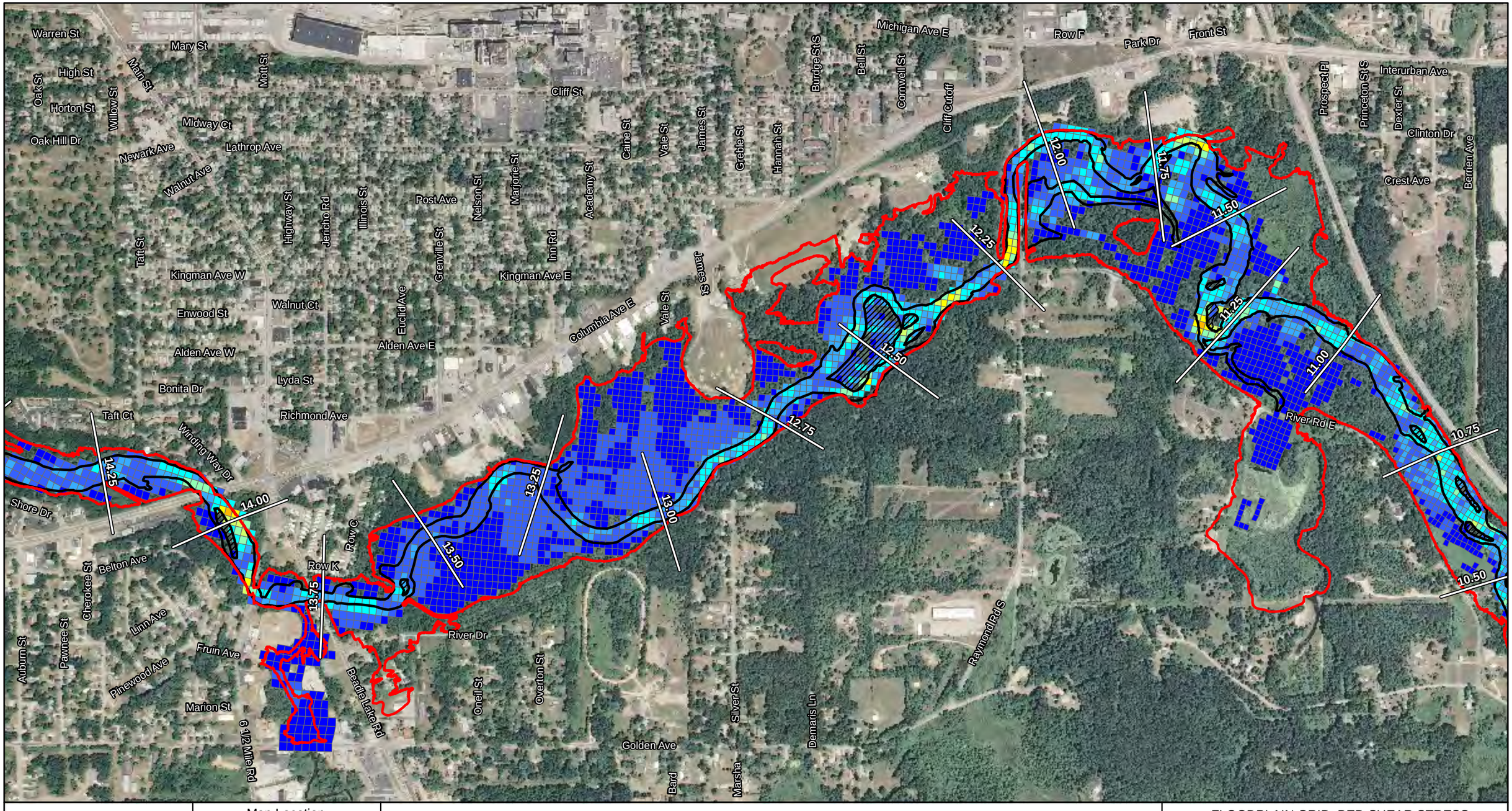
MP 9.00 - MP 10.50

SHEET 4 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_Jun3_2011.mxd

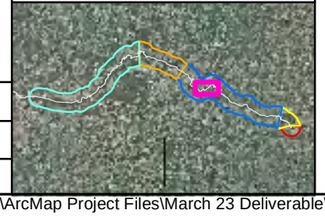
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), June 3, 2011

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N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
JUNE 3, 2011

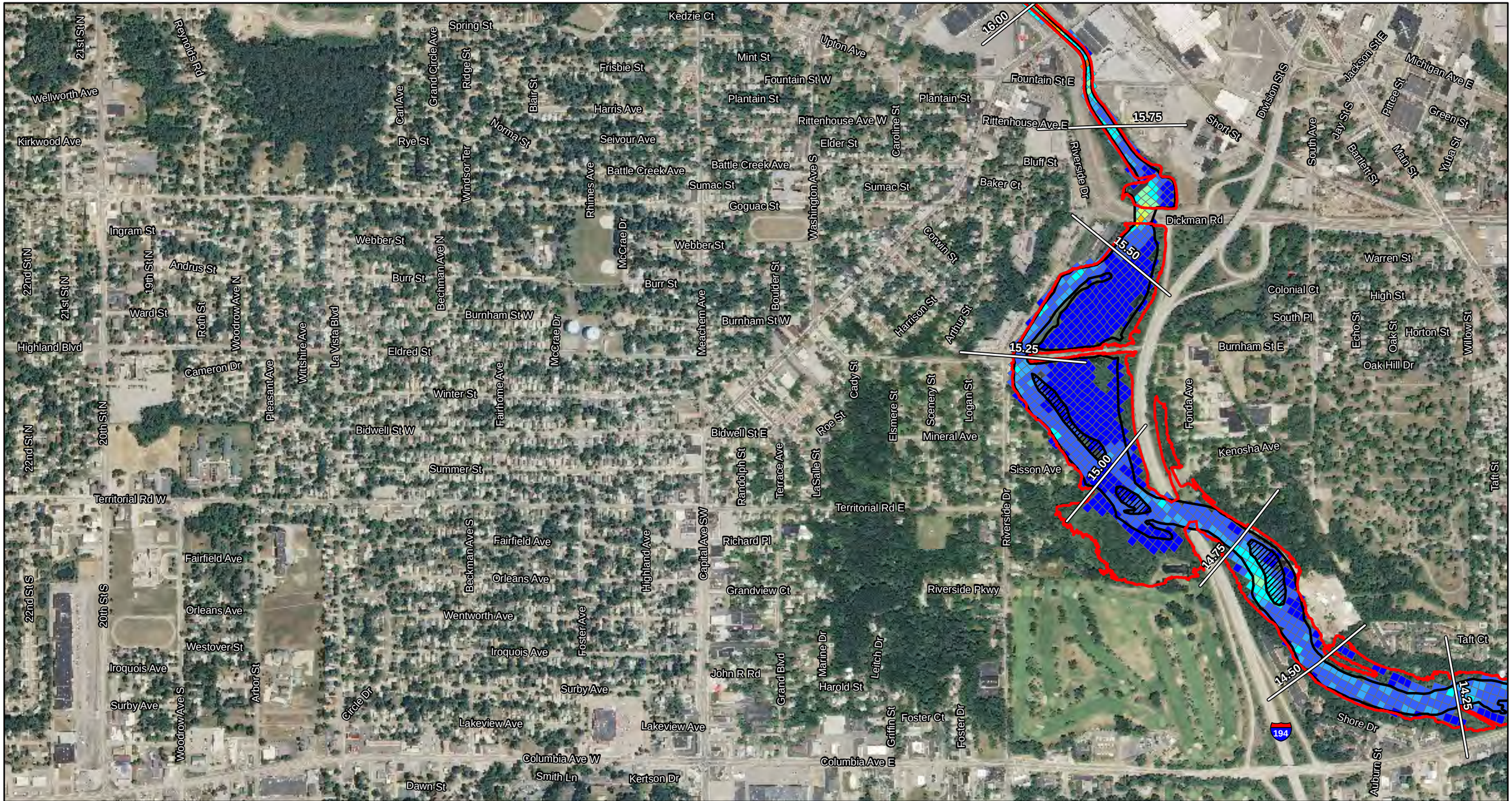
MP 10.50 - MP 14.25

SHEET 5 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_Jun3_2011.mxd

Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), June 3, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
JUNE 3, 2011

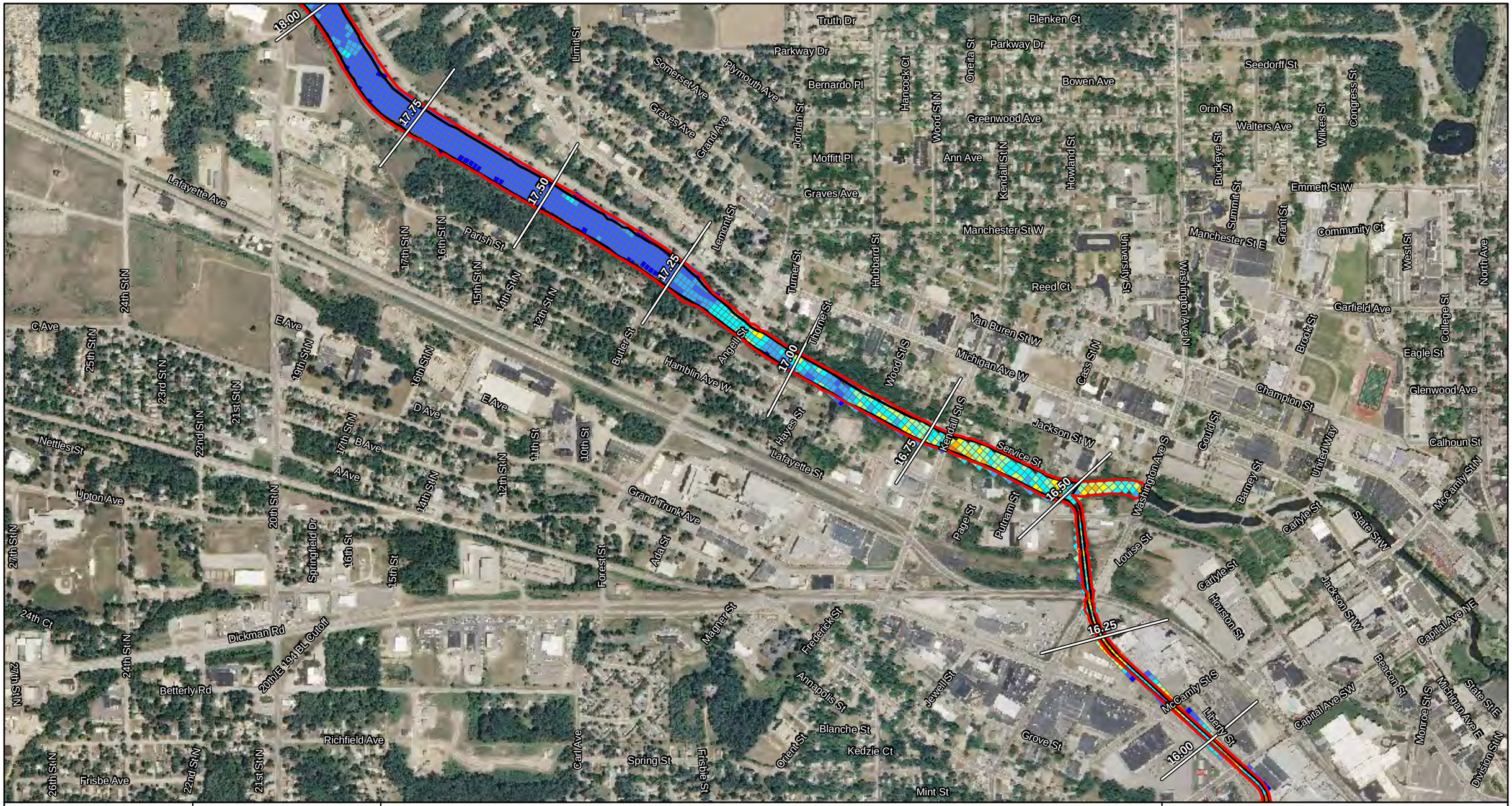
MP 14.25 - MP 16.00

SHEET 6 OF 16

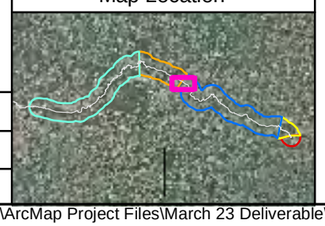
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_Jun3_2011.mxd

Aerial Photography Date: July & August 2009



Map Location



Legend

Bed Shear Stress (Pa), June 3, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

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- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

N

0 400 800 1,600
Scale in Feet

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

FLOODPLAIN GRID: BED SHEAR STRESS
JUNE 3, 2011

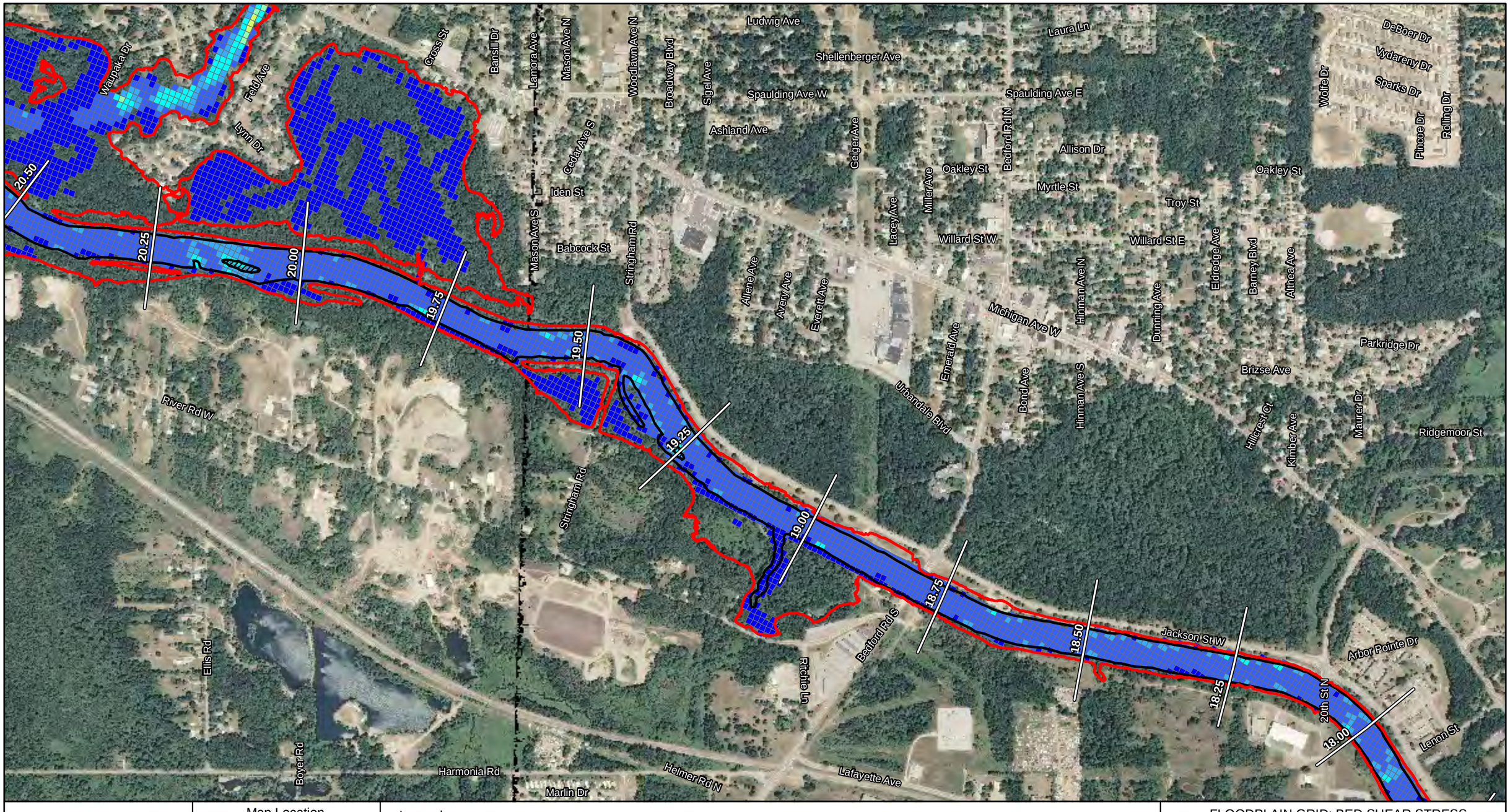
MP 16.00 - MP 18.00

SHEET 7 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_Jun3_2011.mxd

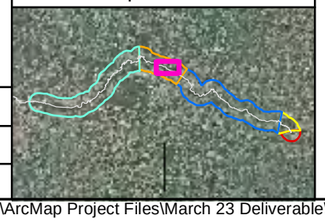
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), June 3, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
JUNE 3, 2011

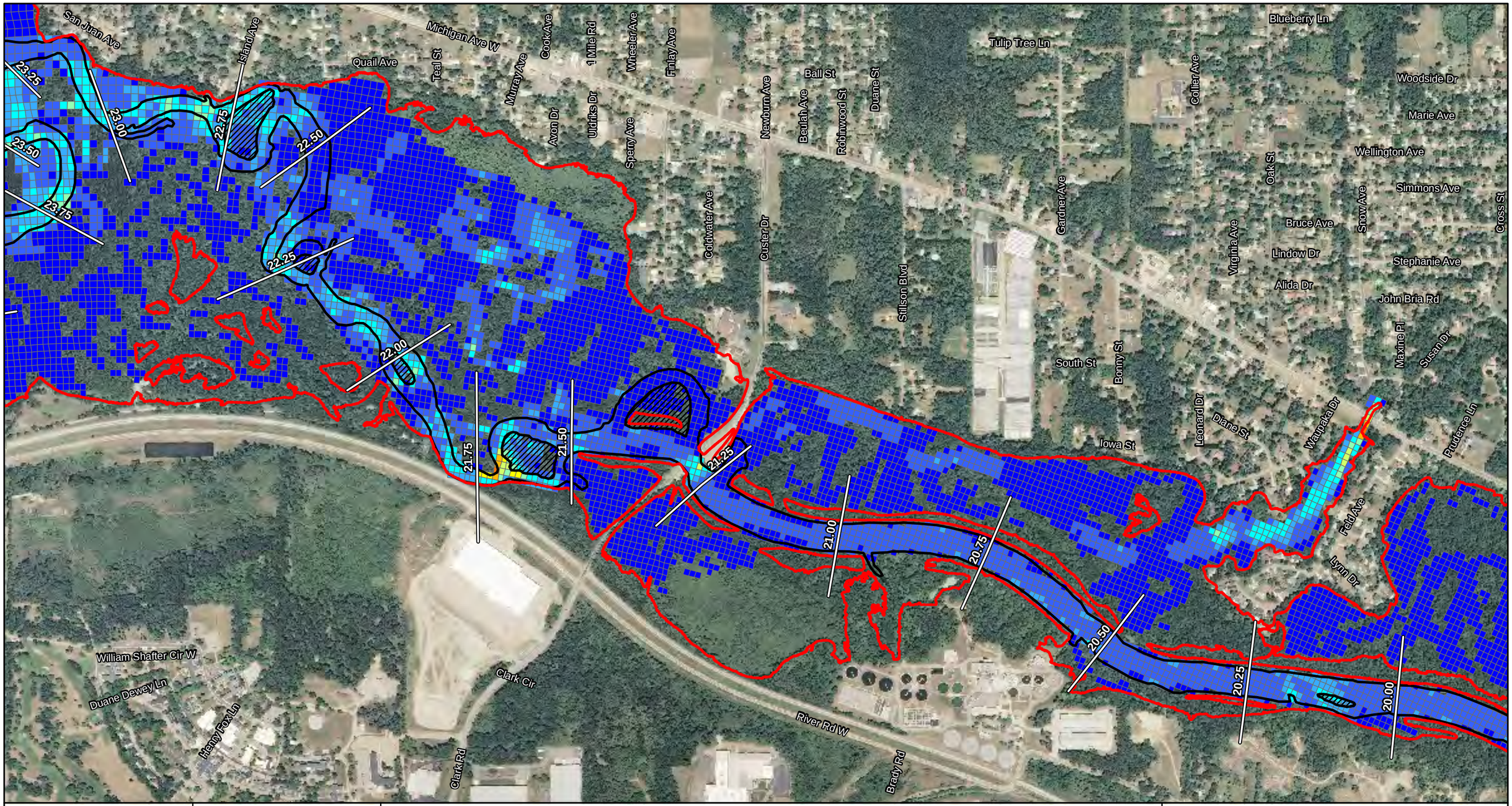
MP 18.00 - MP 20.00

SHEET 8 OF 16

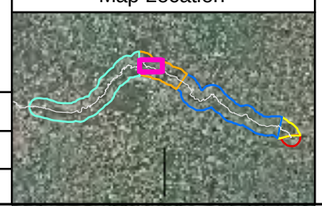
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_Jun3_2011.mxd

Aerial Photography Date: July & August 2009



Map Location



Legend

Bed Shear Stress (Pa), June 3, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

N

0 400 800 1,600
Scale in Feet

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

FLOODPLAIN GRID: BED SHEAR STRESS
JUNE 3, 2011

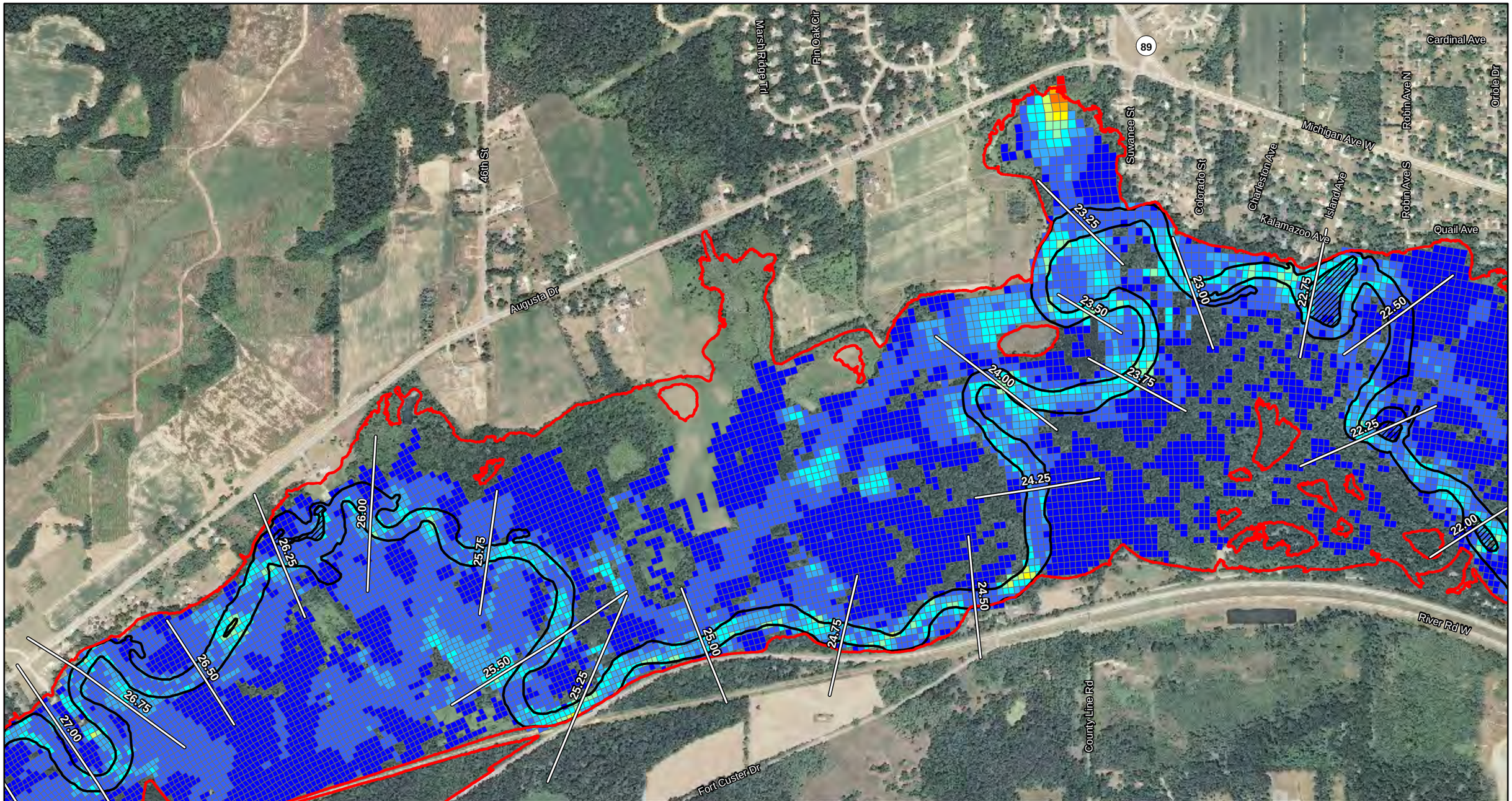
MP 20.00 - MP 22.50

SHEET 9 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), June 3, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
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- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
JUNE 3, 2011

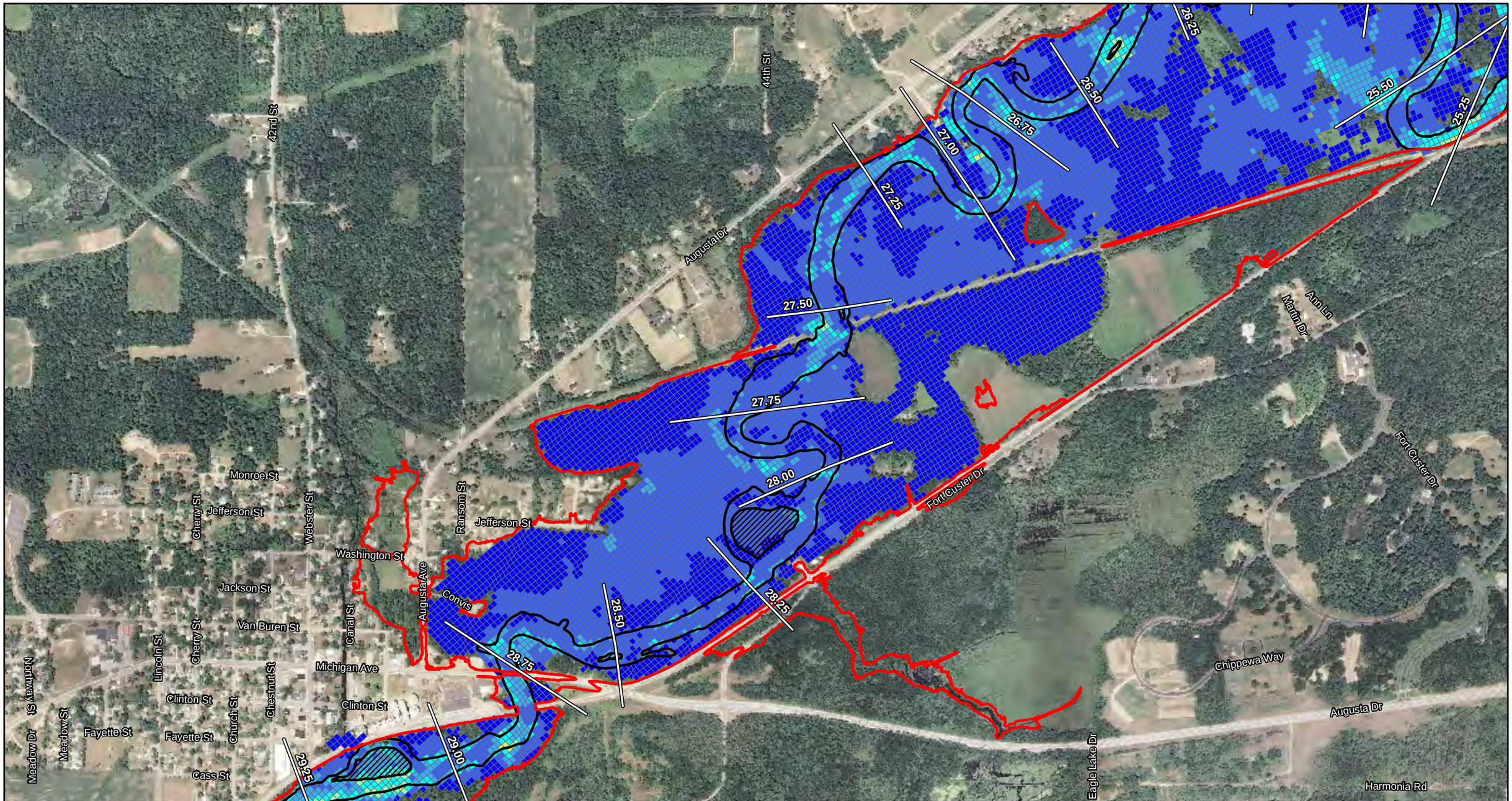
MP 22.50 - MP 27.00

SHEET 10 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), June 3, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

Channel Bankline
Island Bankline
HEC-RAS 100-Year Floodplain
Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
JUNE 3, 2011

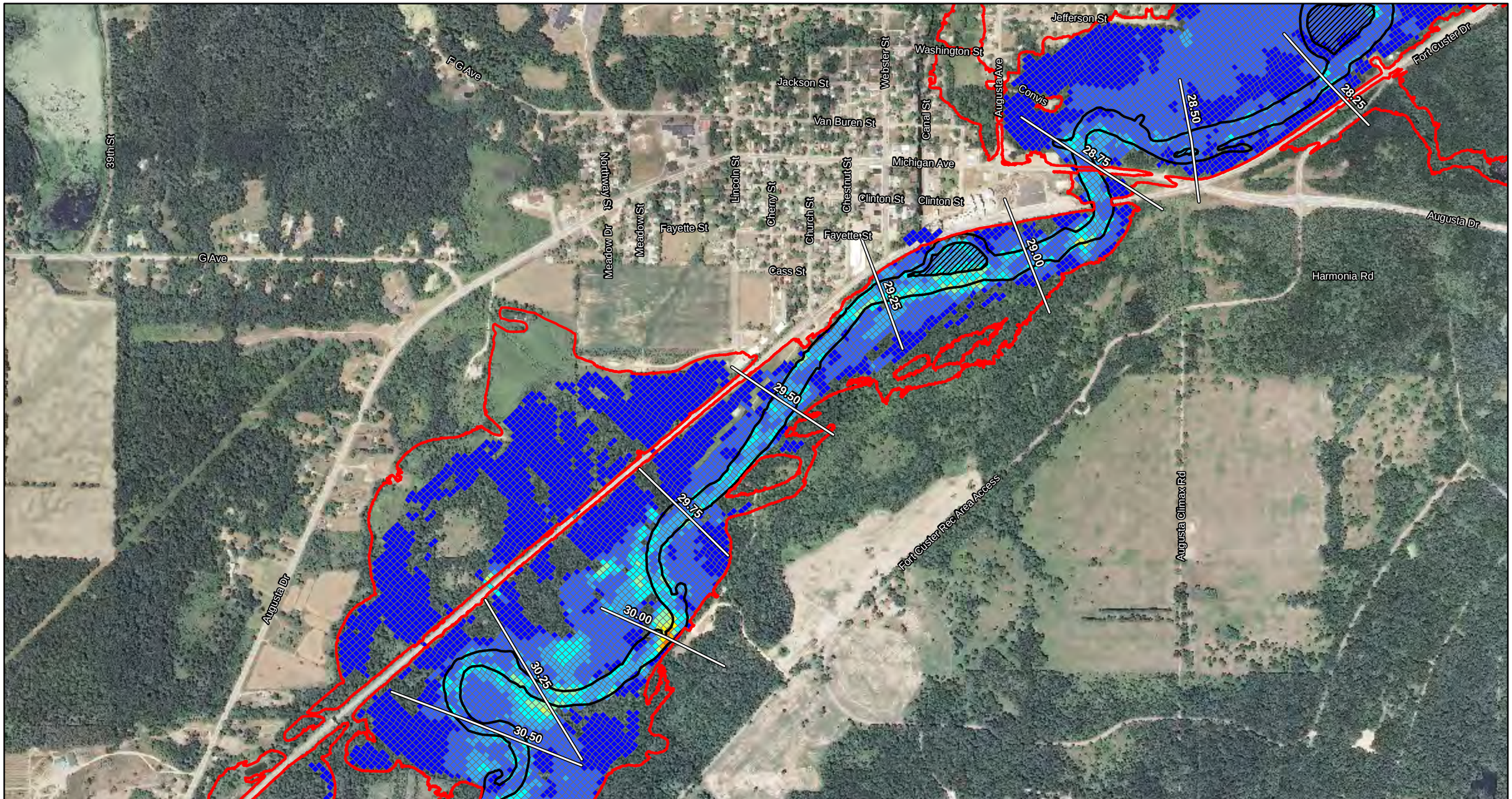
MP 27.00 - MP 28.75

SHEET 11 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), June 3, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
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- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
JUNE 3, 2011

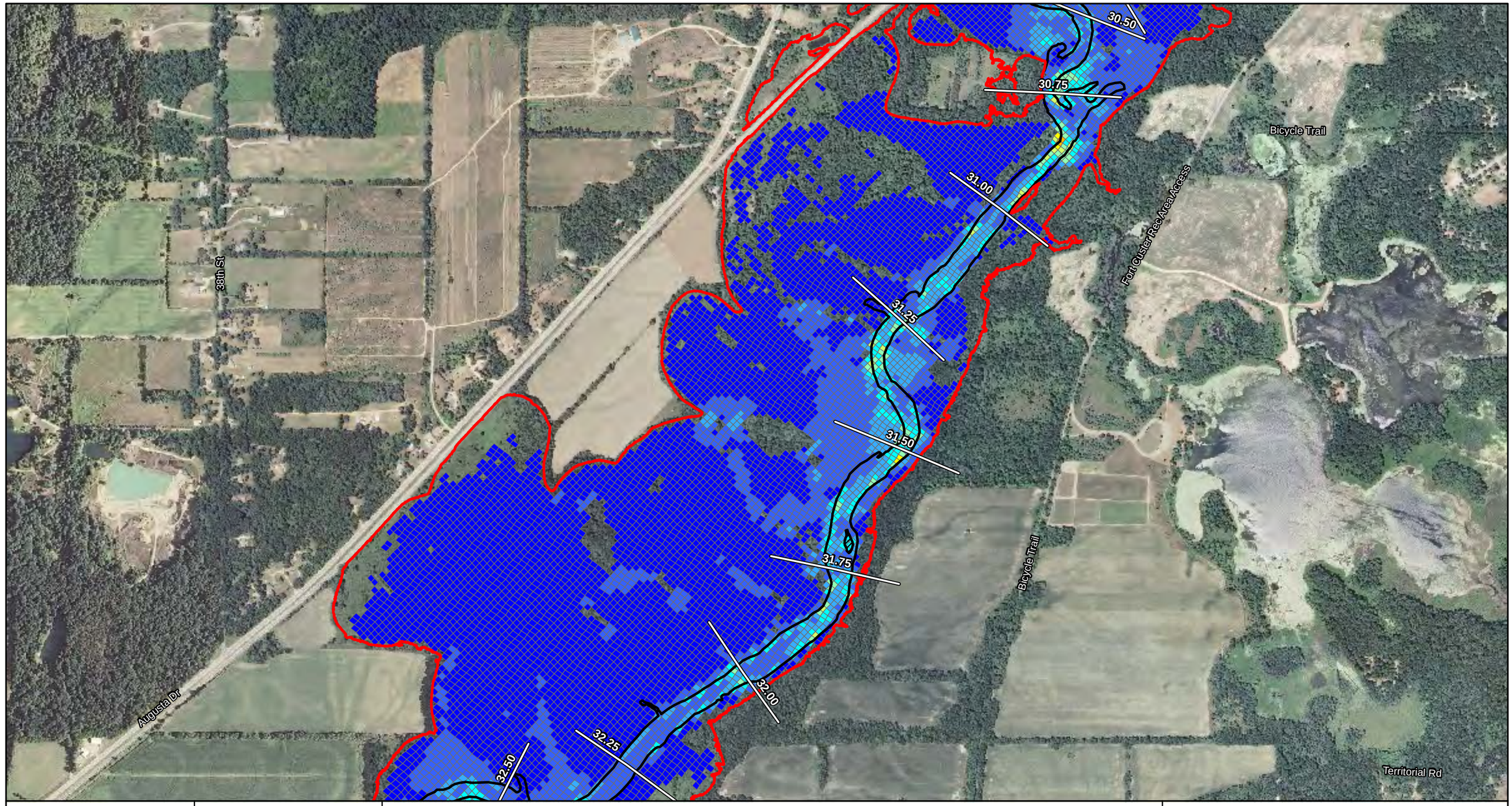
MP 28.75 - MP 30.50

SHEET 12 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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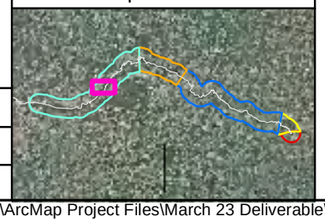
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), June 3, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
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- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
JUNE 3, 2011

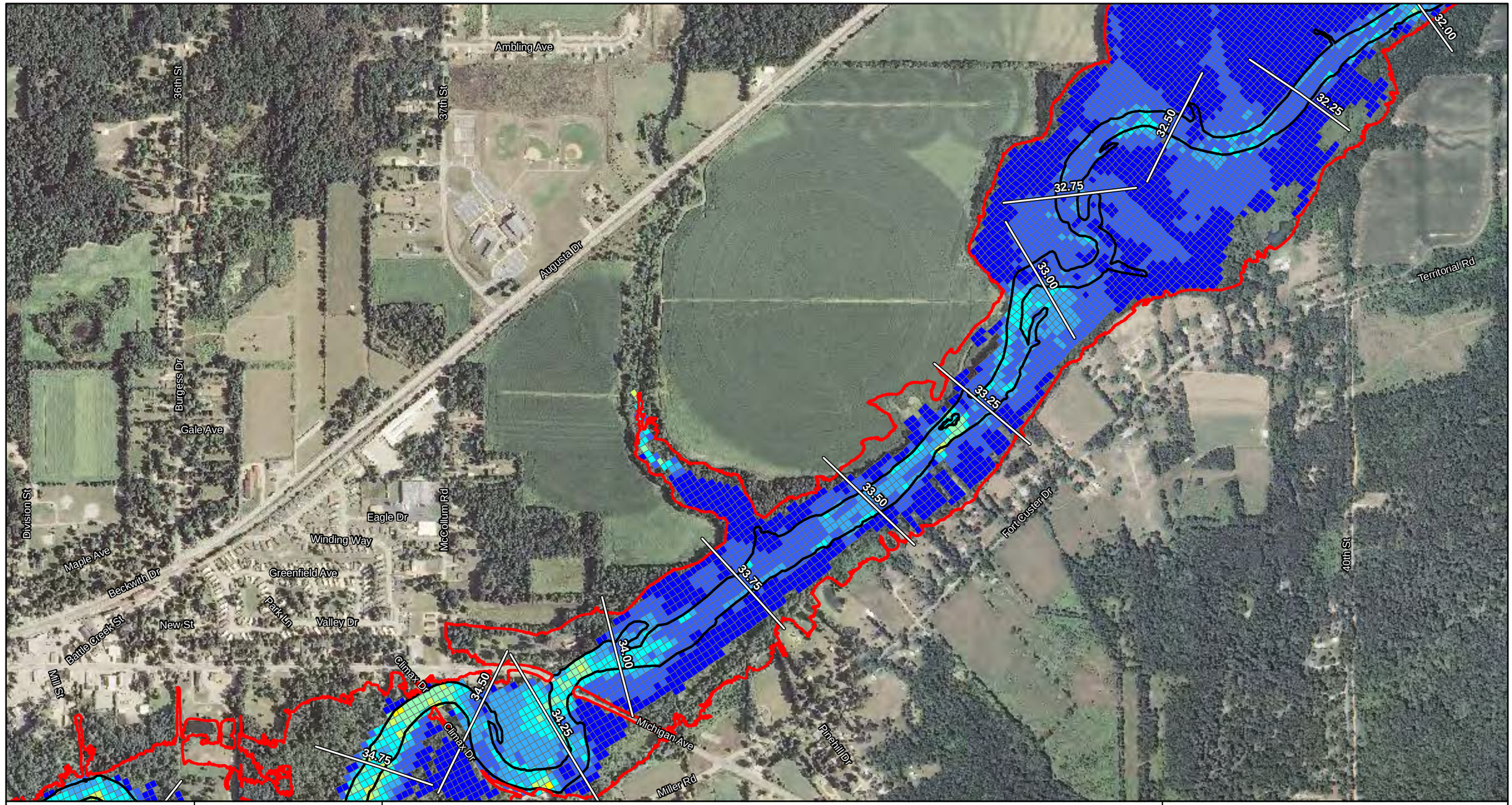
MP 30.50 - MP 32.25

SHEET 13 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_Jun3_2011.mxd

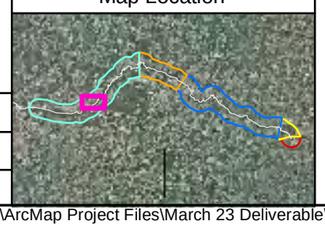
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), June 3, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
JUNE 3, 2011

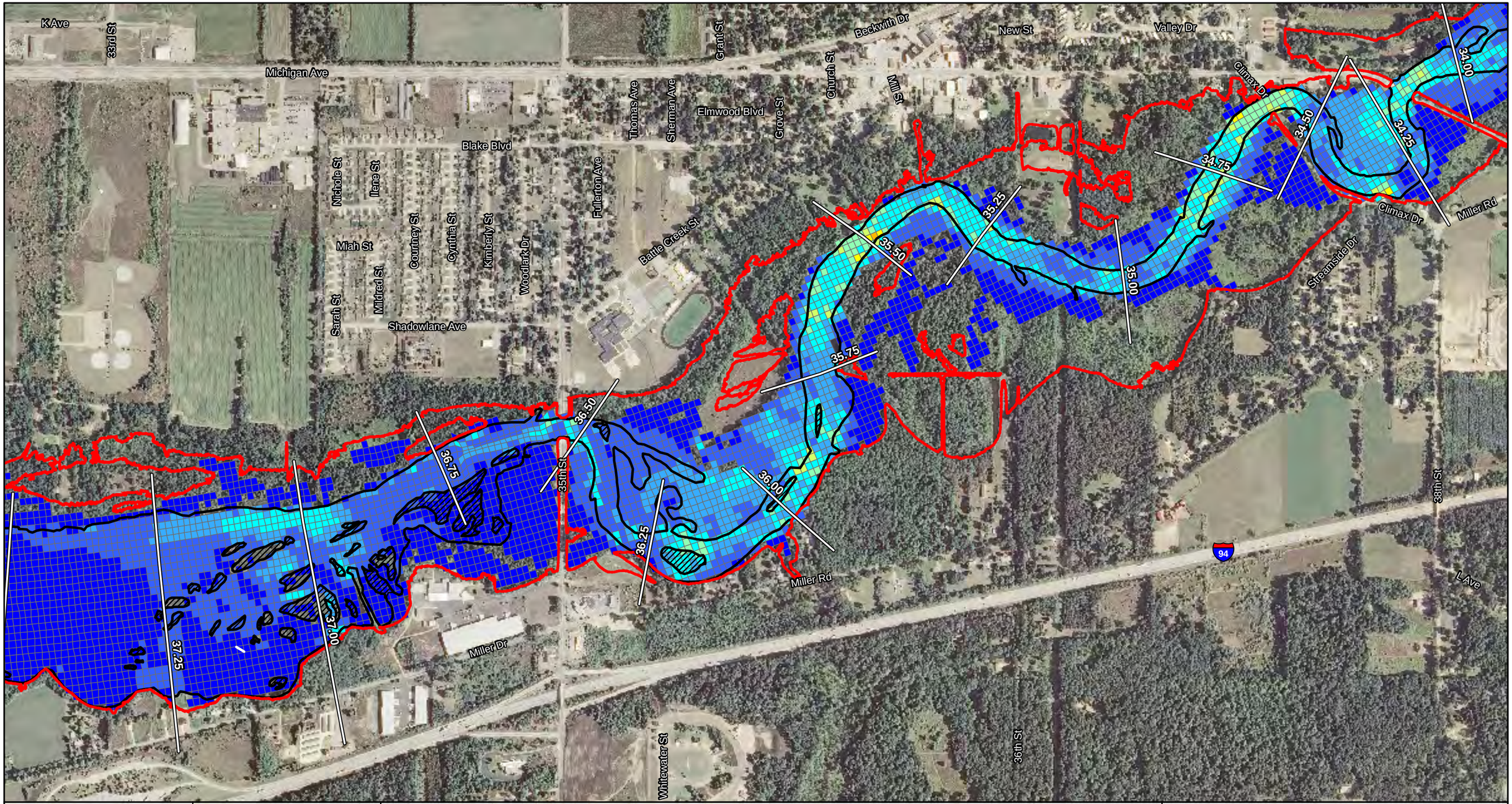
MP 32.25 - MP 34.75

SHEET 14 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_Jun3_2011.mxd

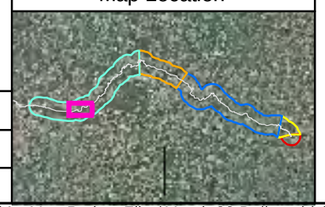
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), June 3, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

Pa = Pascals
cfs = Cubic Feet Per Second

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
JUNE 3, 2011

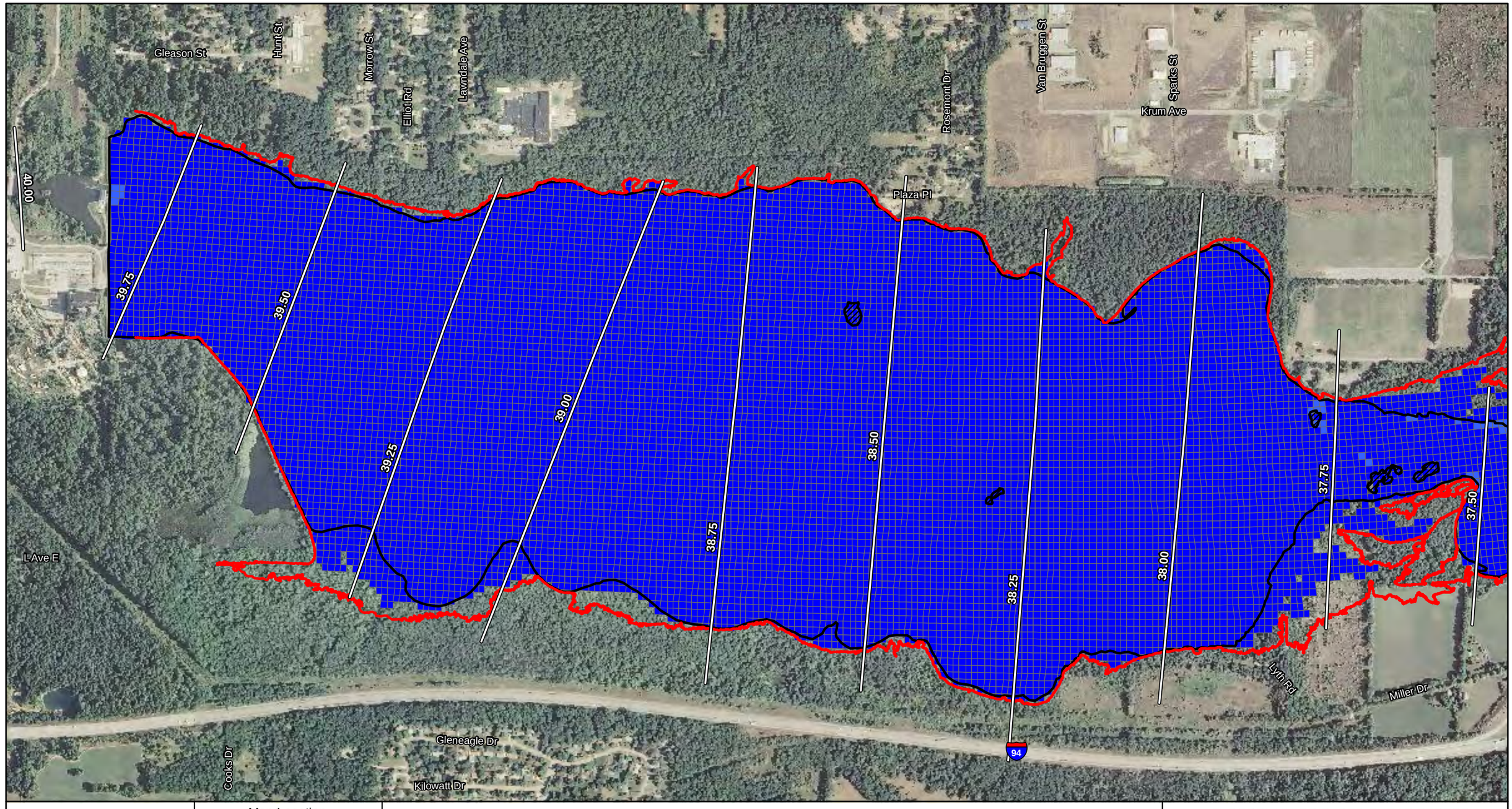
MP 34.25 - MP 37.50

SHEET 15 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_Jun3_2011.mxd

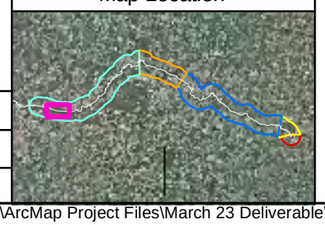
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), June 3, 2011

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 1,850 cfs

N

0 400 800 1,600
Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
JUNE 3, 2011

MP 37.50 - MP 40.00

SHEET 16 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_Jun3_2011.mxd

Aerial Photography Date: July & August 2009

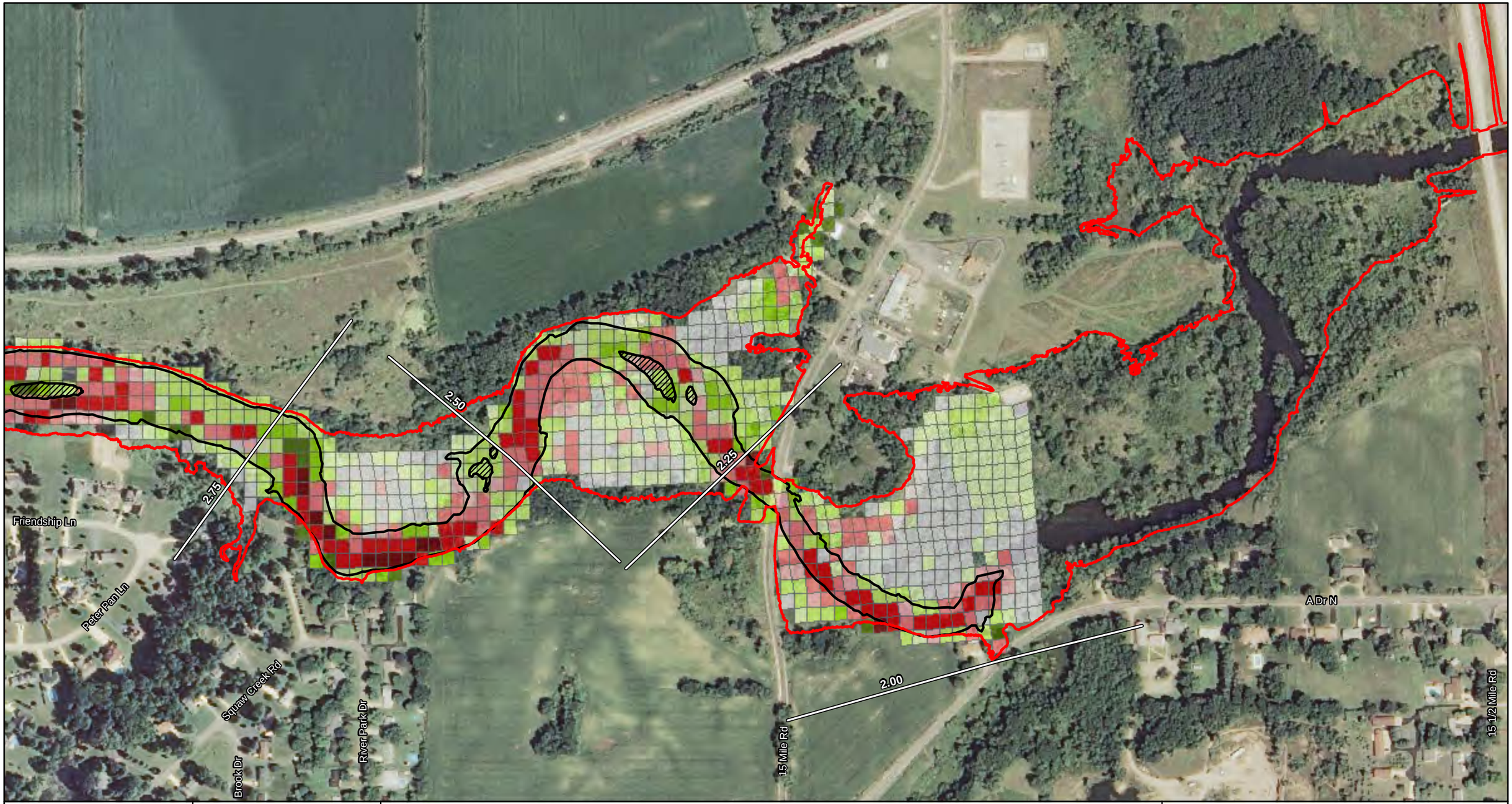
Figure 5-21

Floodplain Grid: Sedimentation Rate

All Grid Cells

May 27 – June 3, 2011

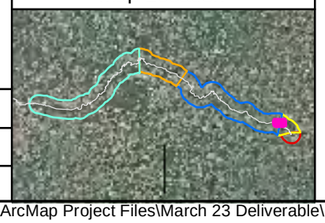
Sheets 1 through 45



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

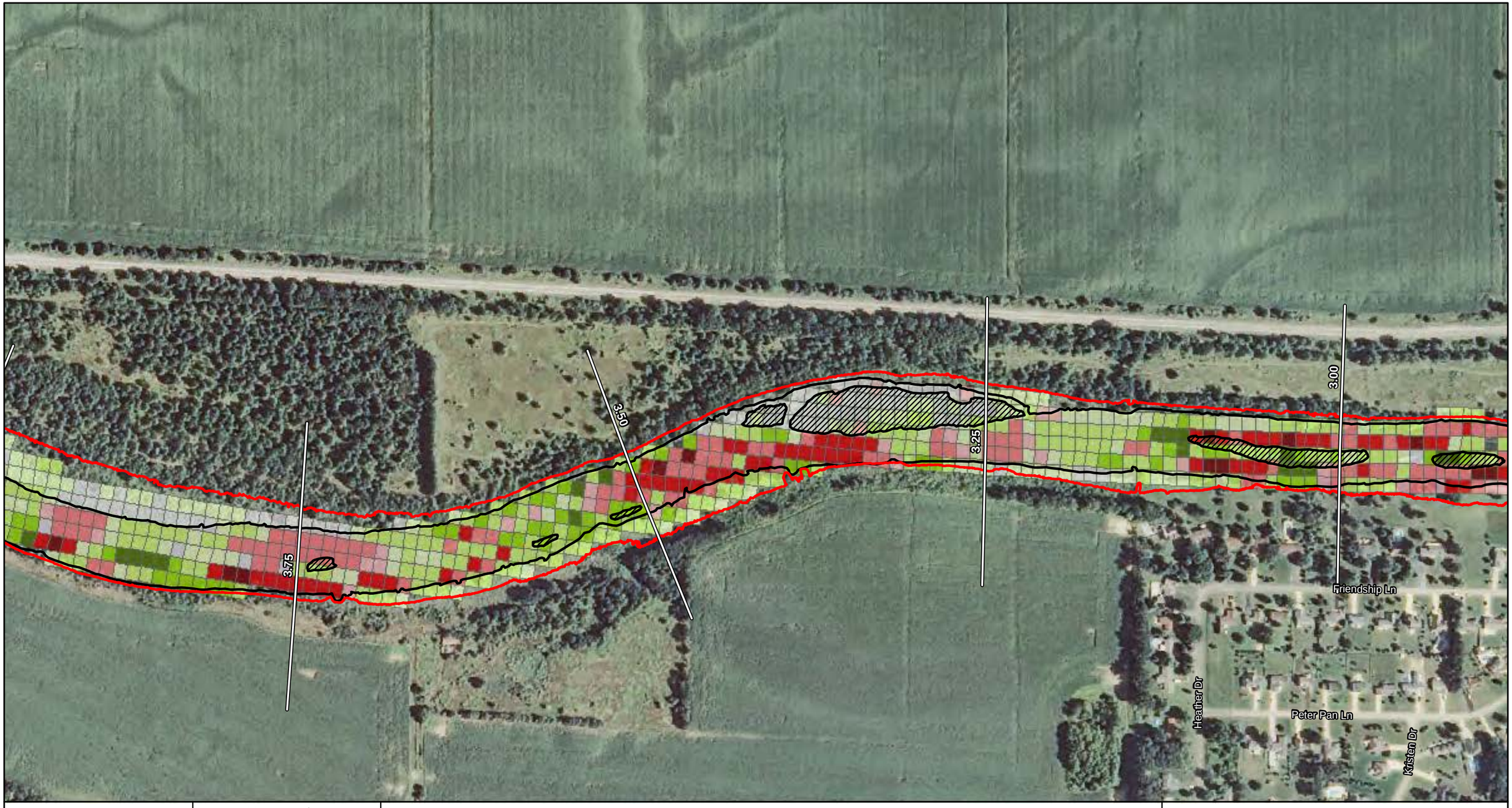
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 01.88 - MP 02.91

SHEET 1 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Sedimentation_Rate_May-June_2011.mxd

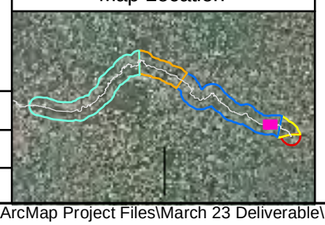
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 02.91 - MP 03.93

SHEET 2 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Sedimentation_Rate_May-June_2011.mxd

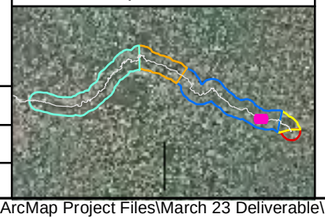
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

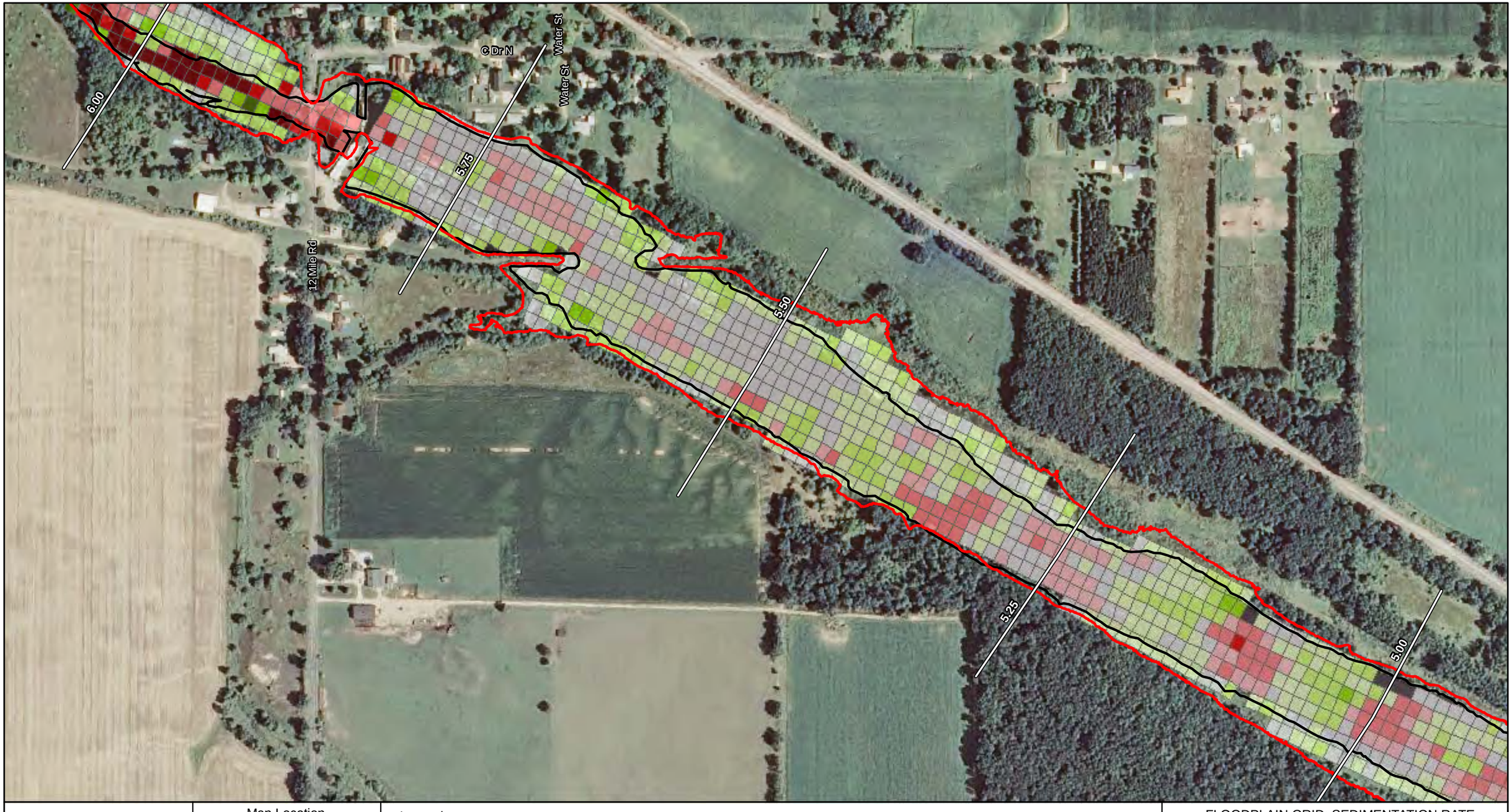
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 03.93 - MP 04.98

SHEET 3 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Sedimentation_Rate_May-June_2011.mxd

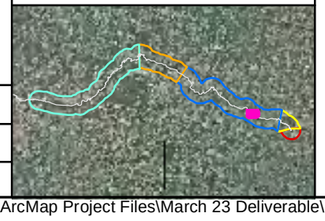
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 04.98 - MP 06.03

SHEET 4 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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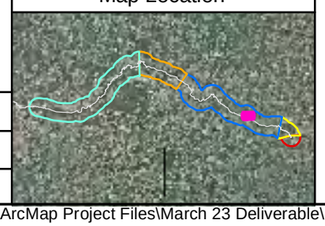
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 06.03 - MP 06.85

SHEET 5 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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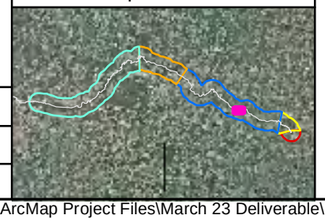
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

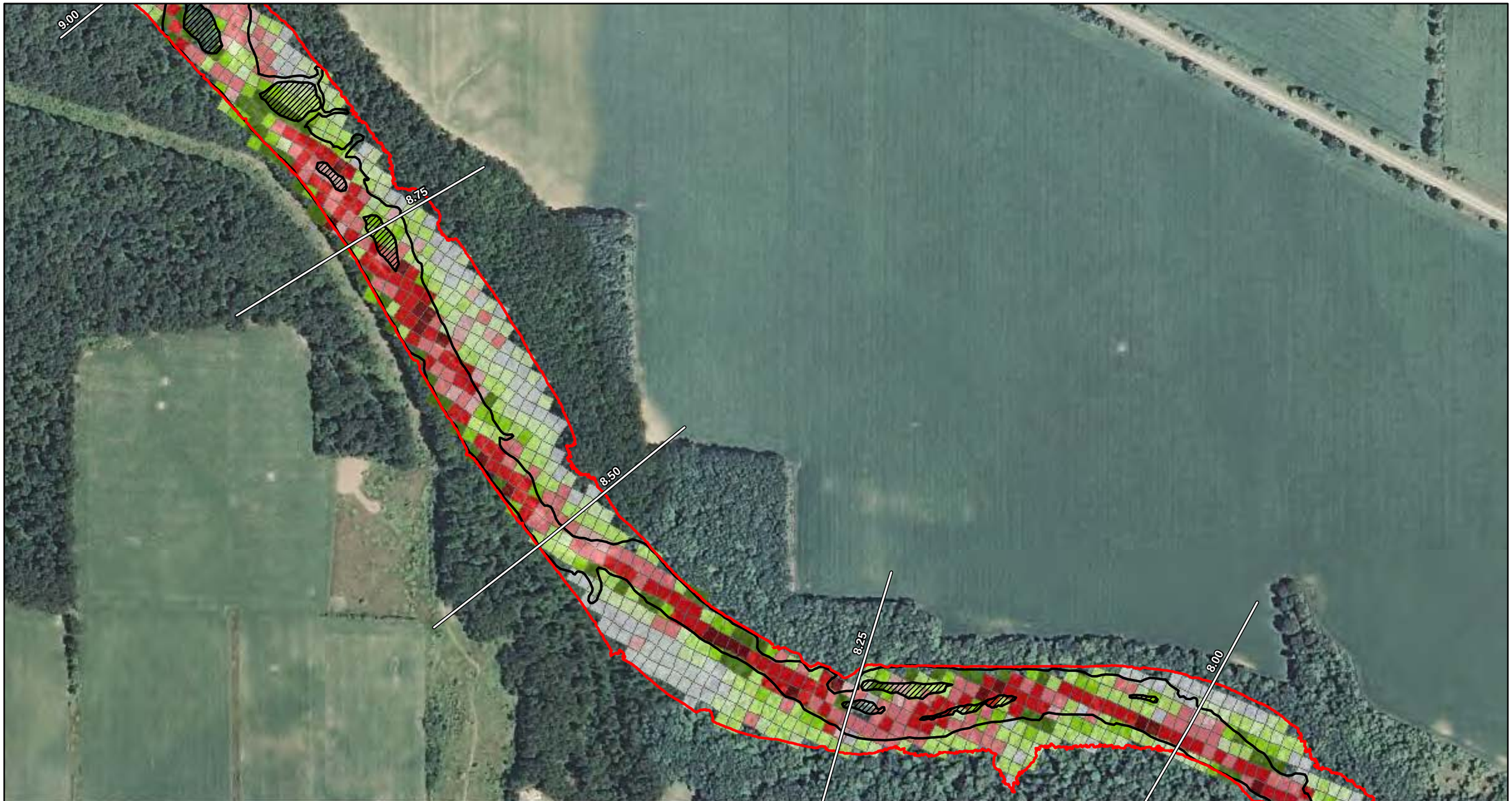
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 06.85 - MP 07.95

SHEET 6 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Sedimentation_Rate_May-June_2011.mxd

Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 07.95 - MP 08.93

SHEET 7 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

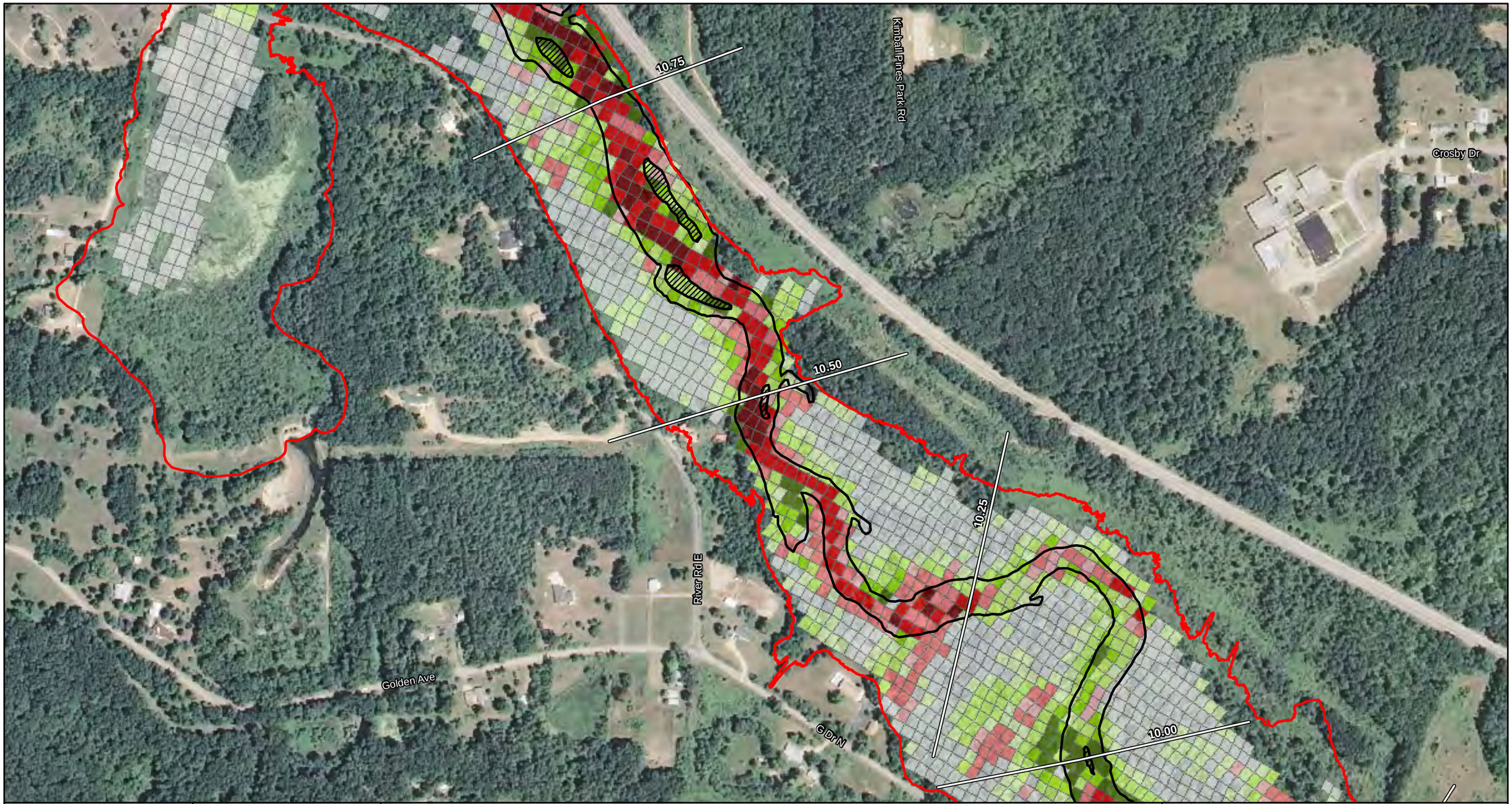
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 08.93 - MP 10.00

SHEET 8 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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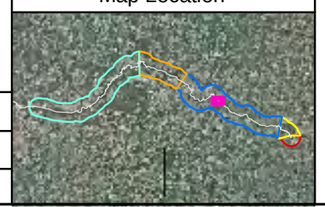
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 10.00 - MP 10.80

SHEET 9 OF 45

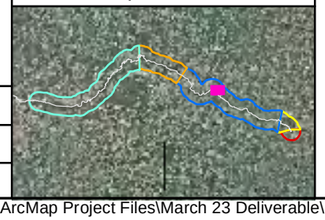
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



Map Location



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

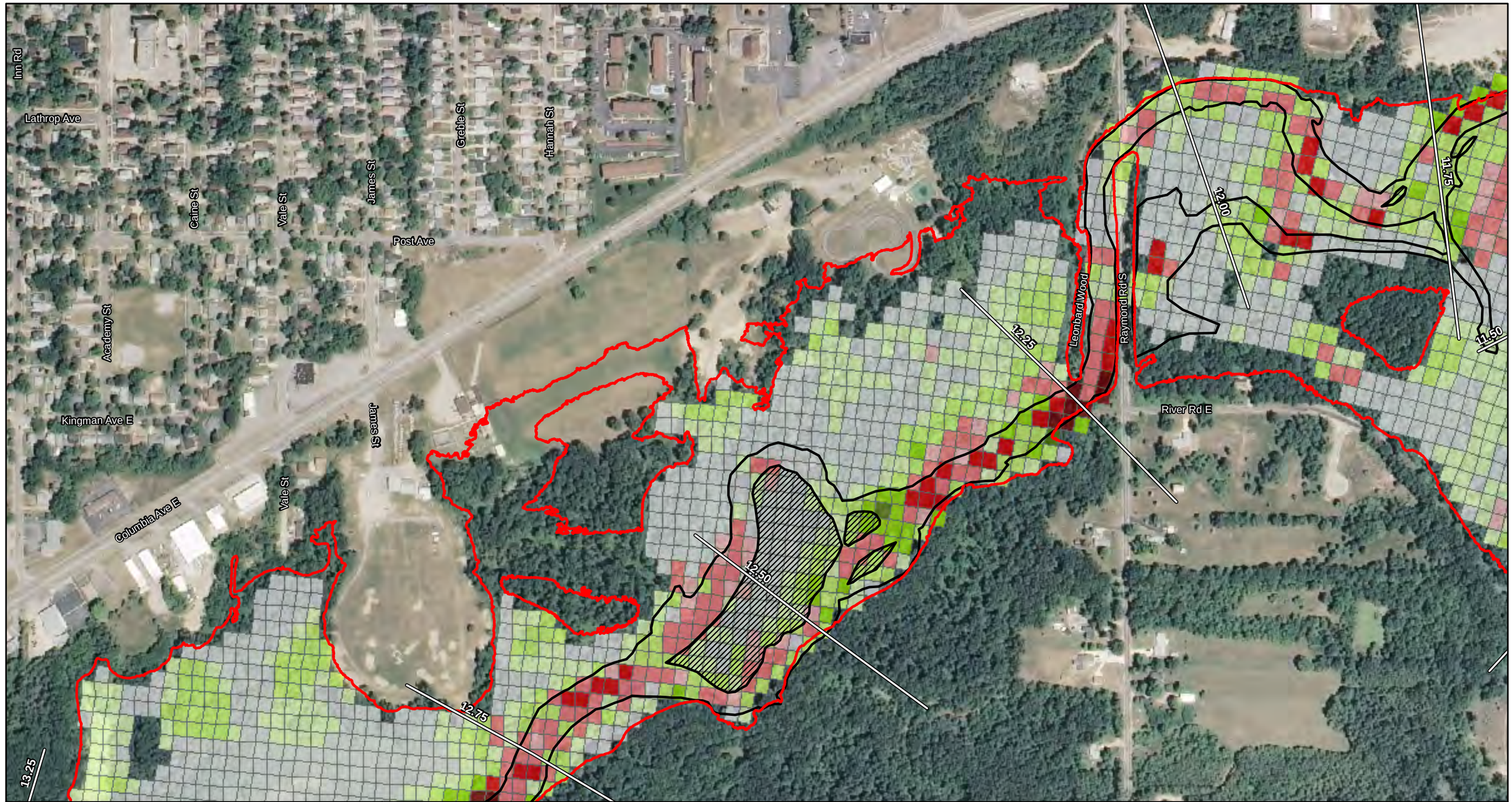
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 10.80 - MP 11.70

SHEET 10 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

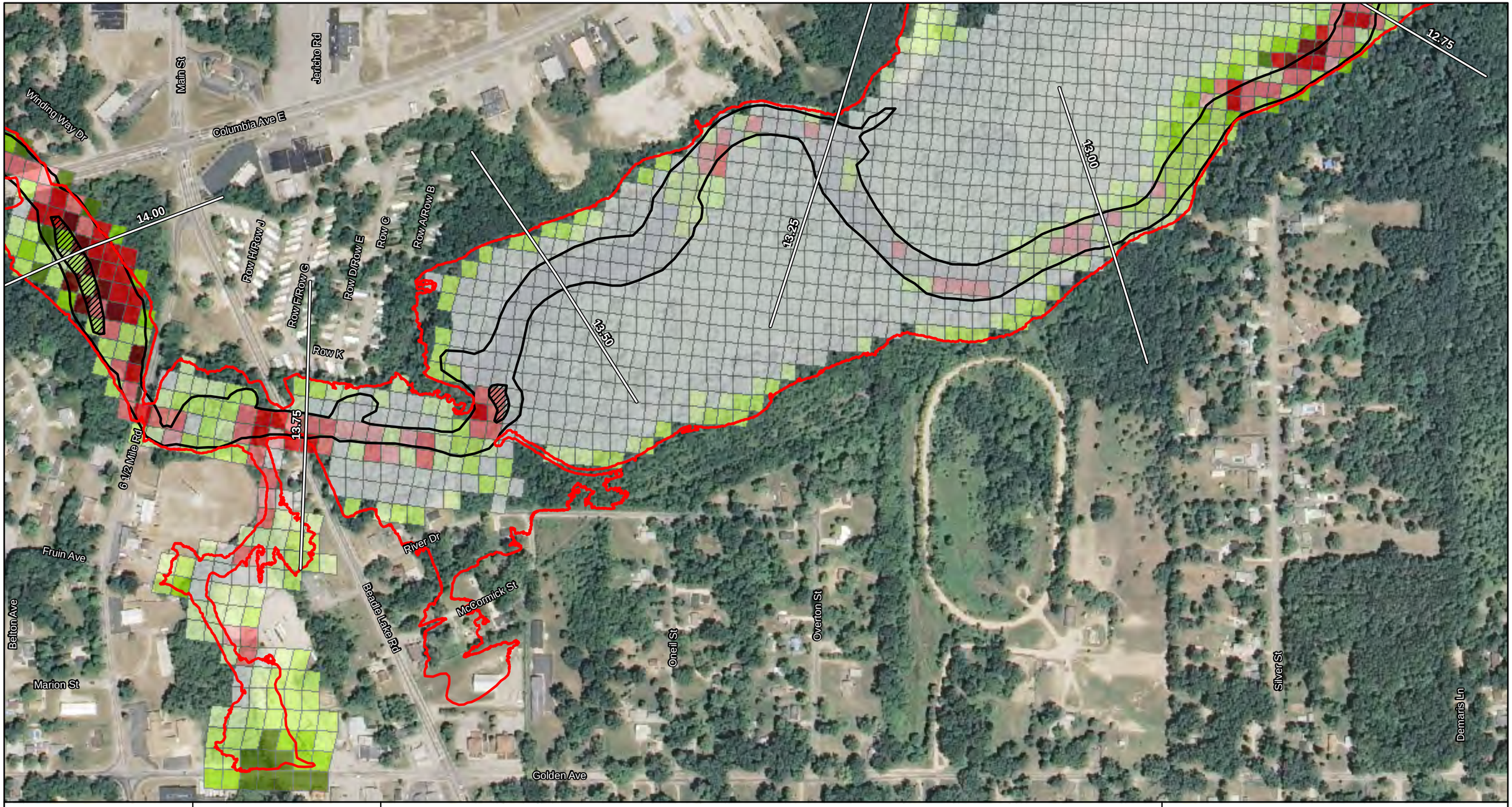
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 11.70 - MP 12.77

SHEET 11 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

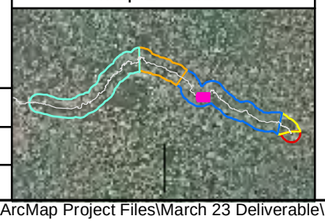
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Aerial Photography Date: July & August 2009



Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

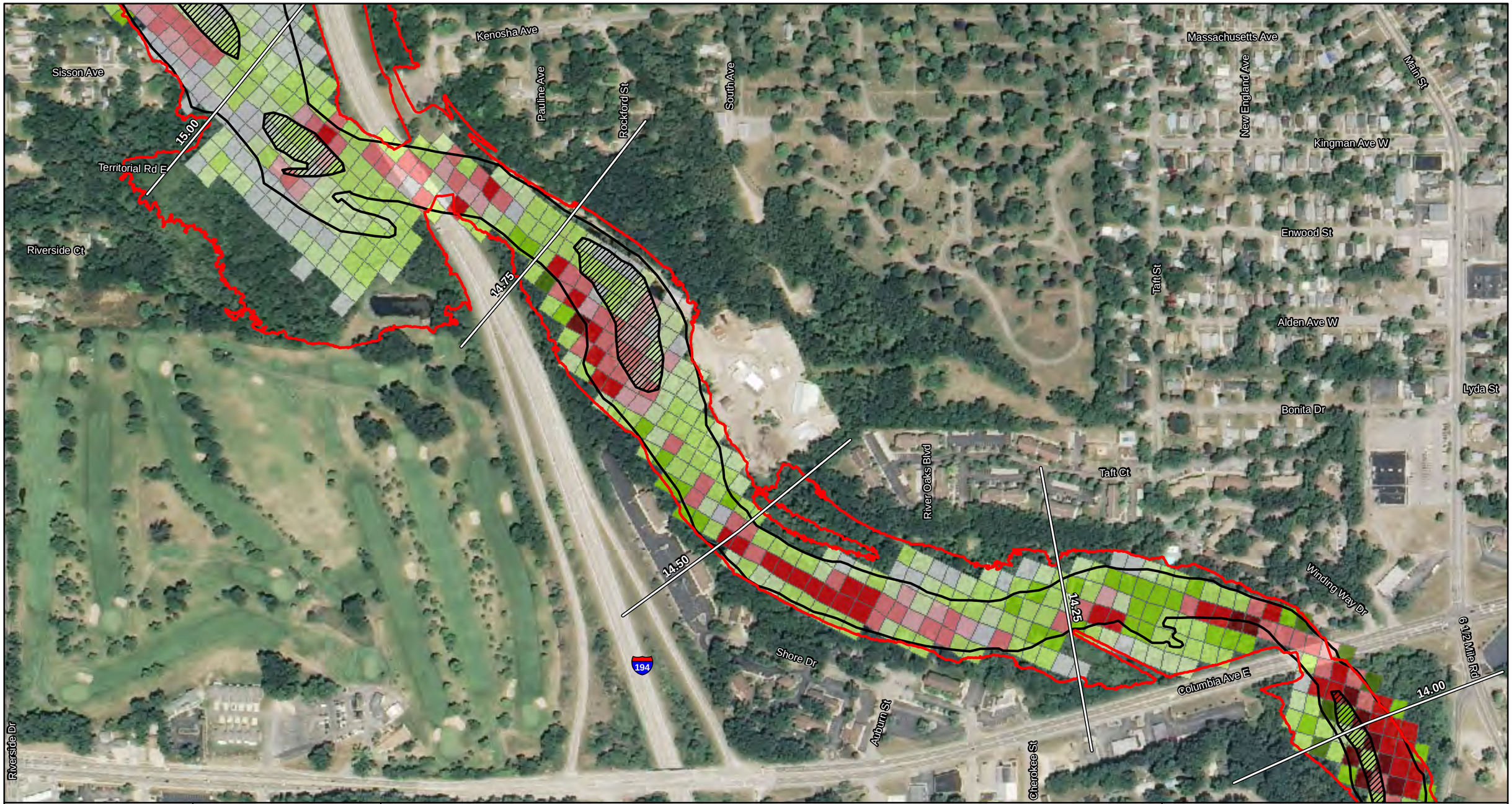
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 12.77 - MP 14.00

SHEET 12 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

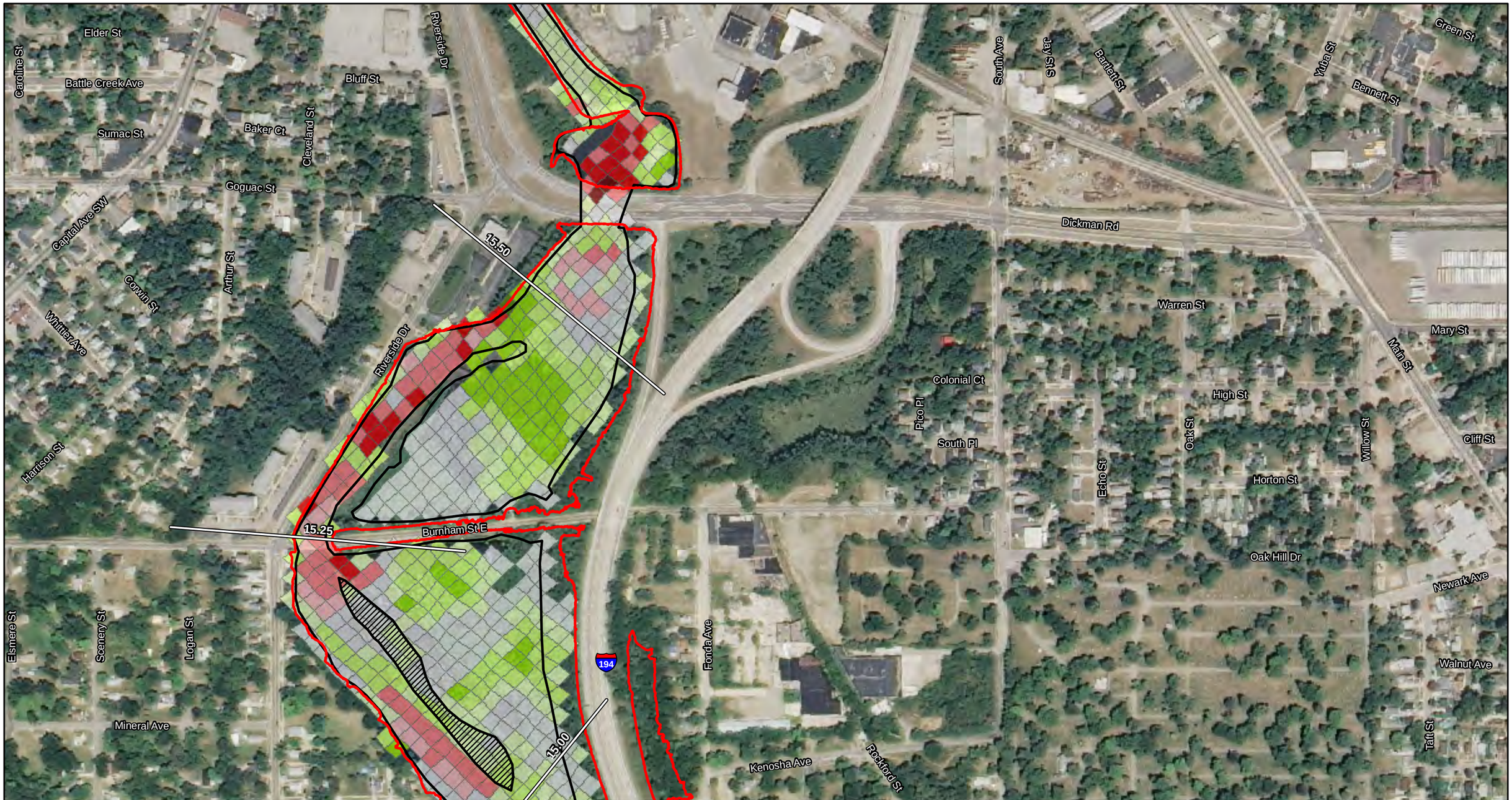
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 14.00 - MP 15.05

SHEET 13 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 15.05 - MP 15.71

SHEET 14 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 15.71 - MP 16.38

SHEET 15 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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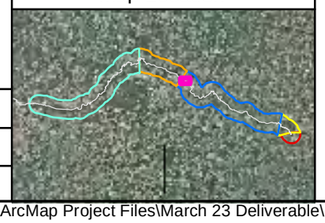
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

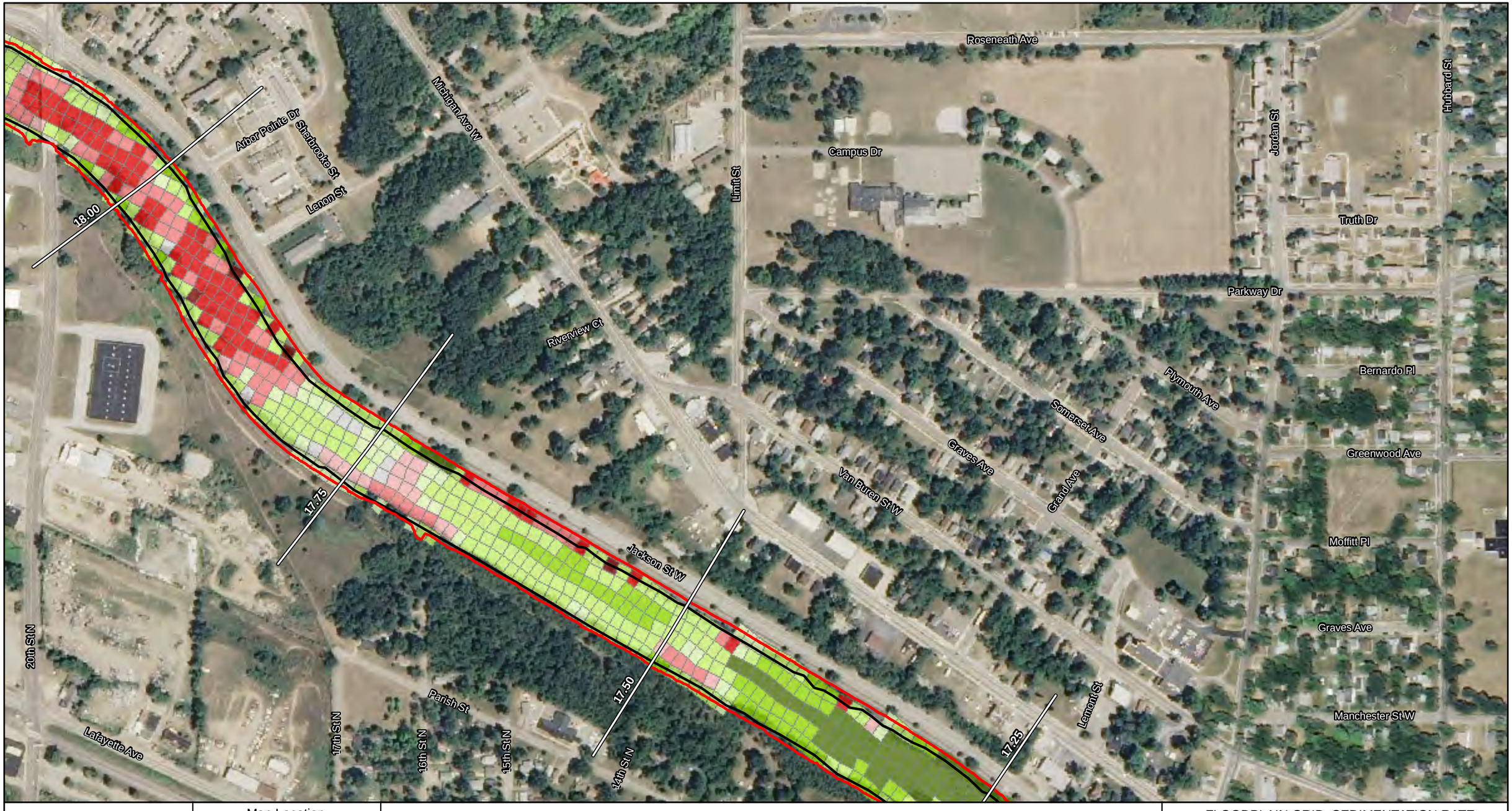
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 16.38 - MP 17.30

SHEET 16 OF 45

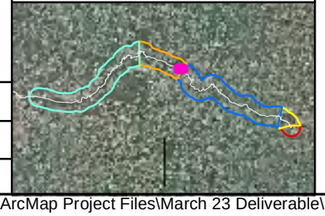
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Sedimentation_Rate_May-June_2011.mxd

Aerial Photography Date: July & August 2009



Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

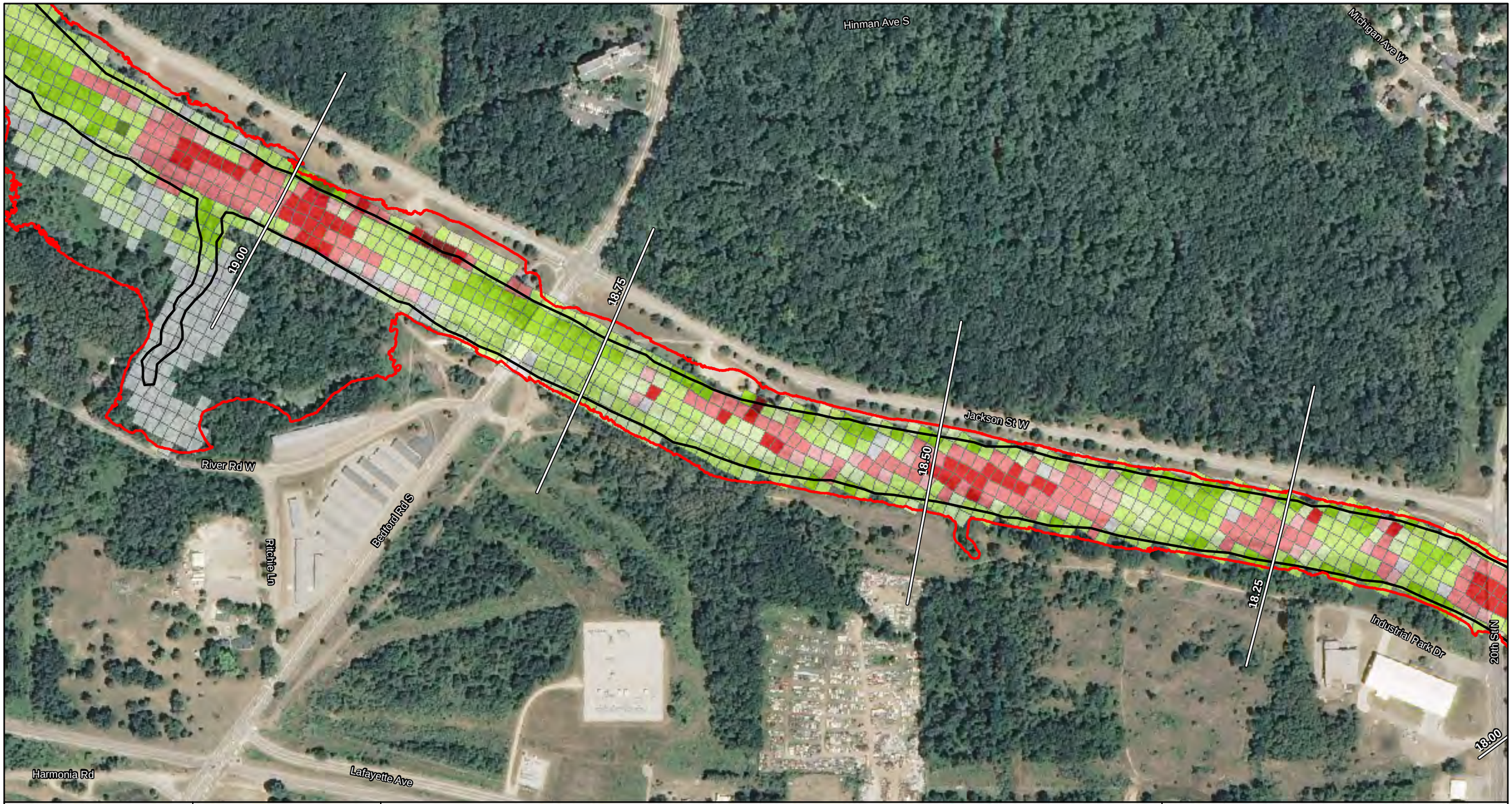
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 17.30 - MP 18.11

SHEET 17 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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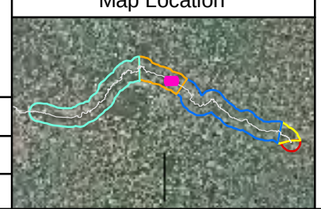
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

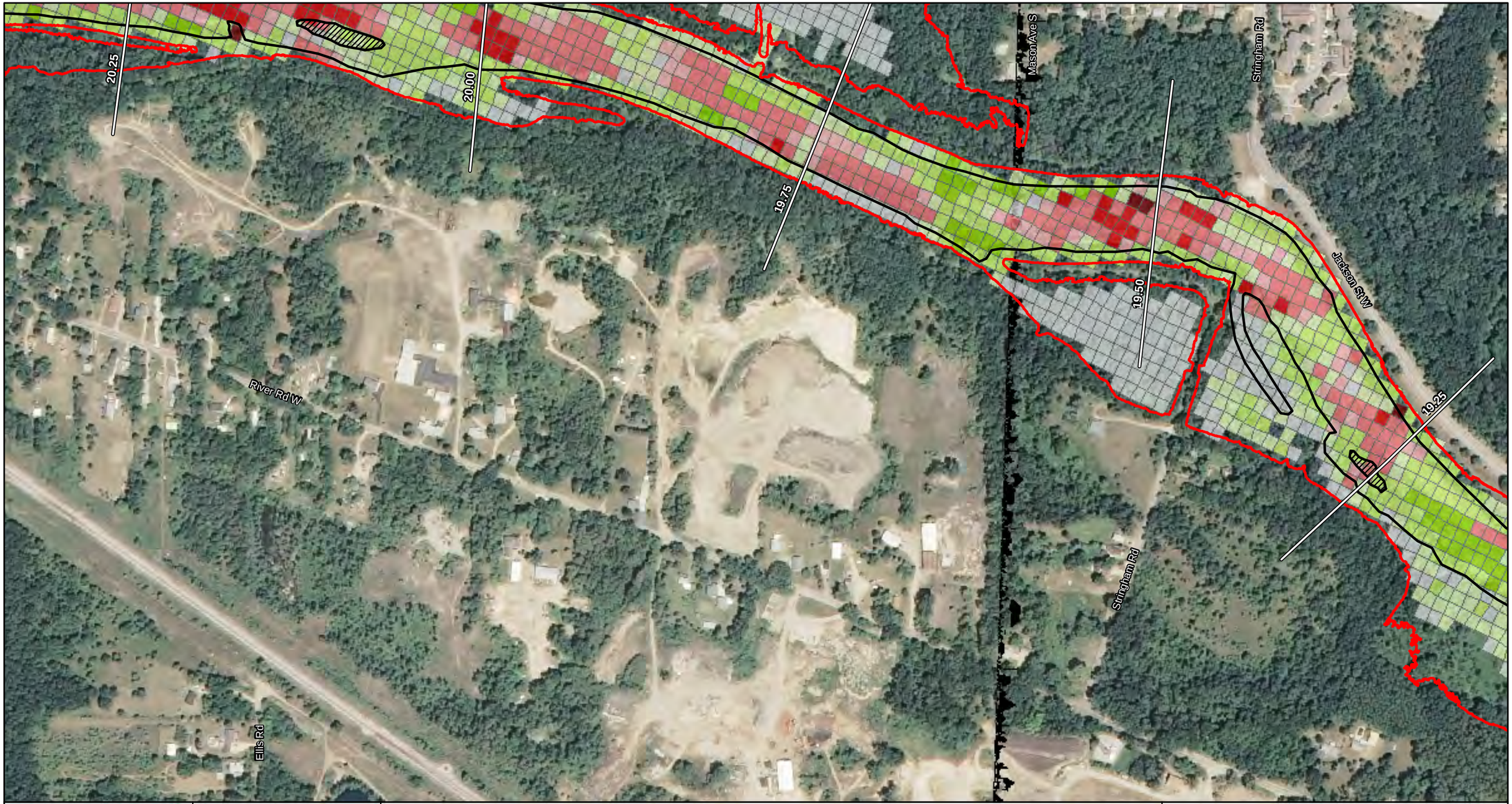
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 18.11 - MP 19.18

SHEET 18 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Sedimentation_Rate_May-June_2011.mxd

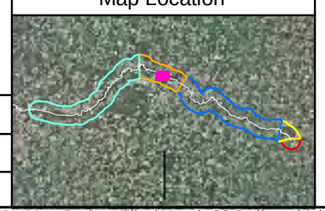
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

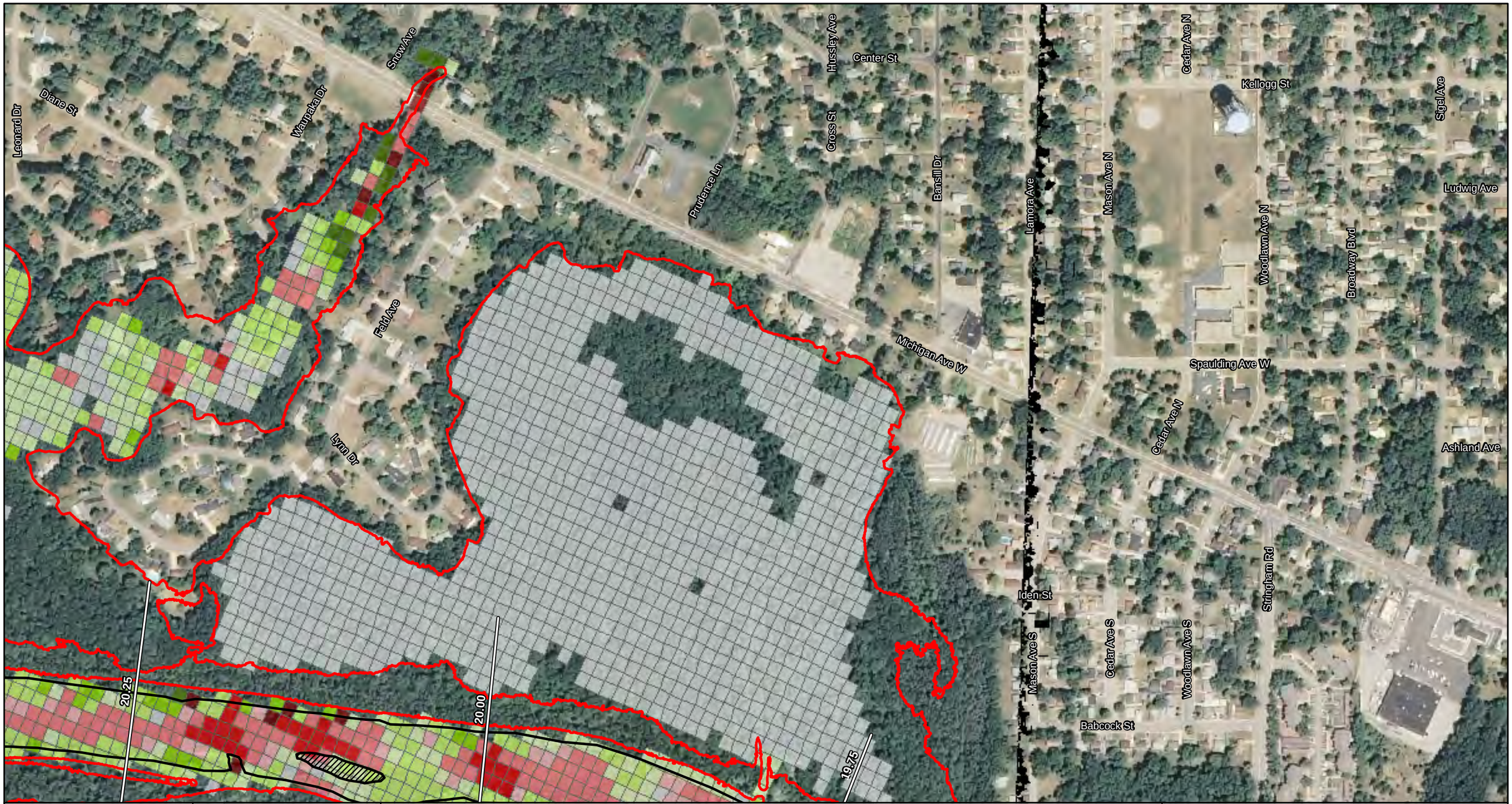
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 19.18 - MP 20.00

SHEET 19 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

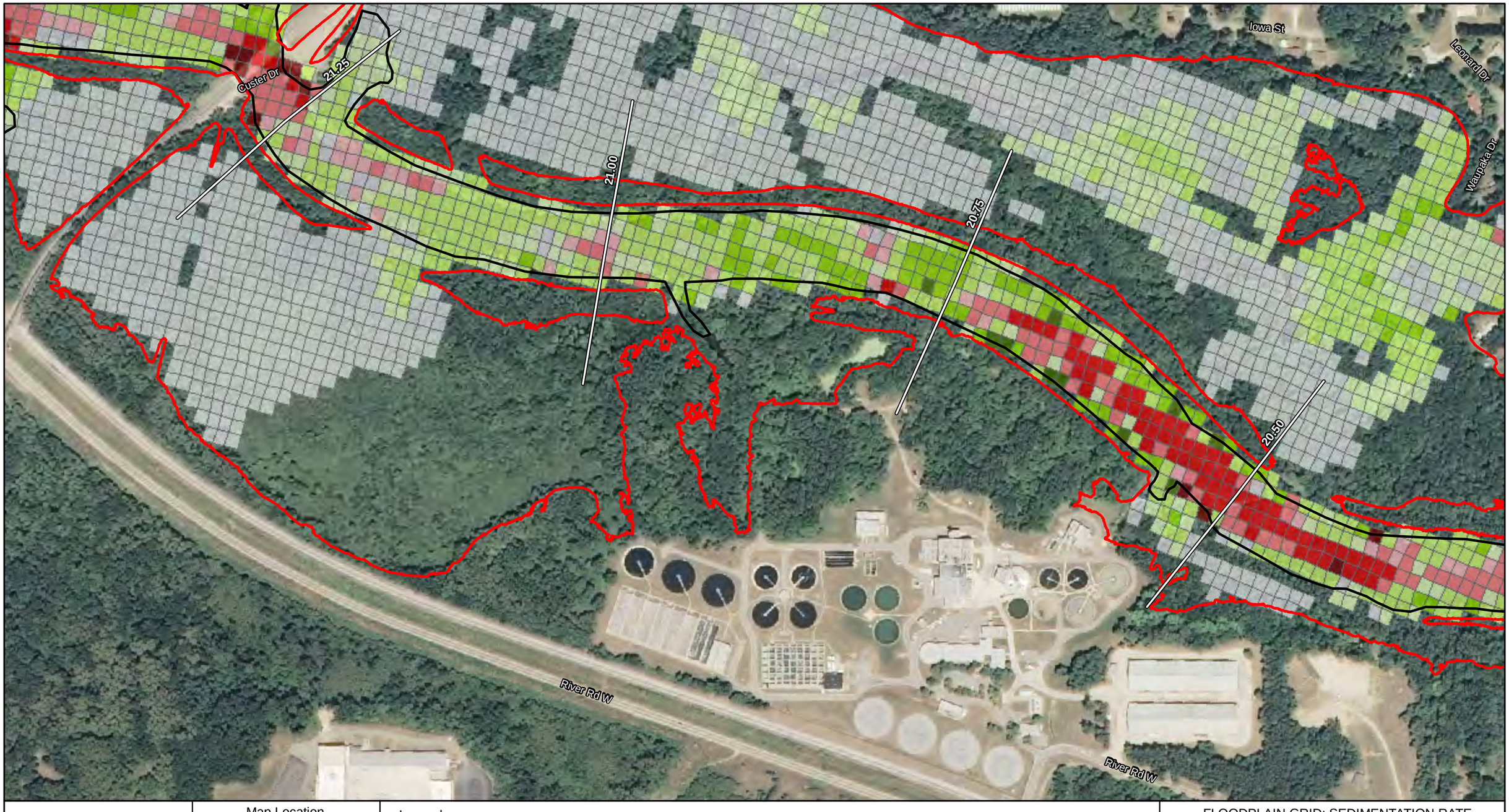
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 20.00 - MP 20.32

SHEET 20 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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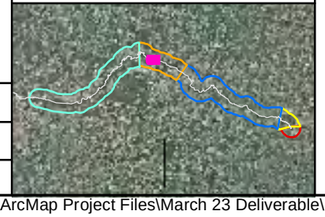
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 20.32 - MP 21.36

SHEET 21 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009

Avon Dr
Sperry Ave
Finlay Ave
Coldwater Ave
Custer Dr
Duane St
Michigan Ave W
Stillson Blvd
Gardner Ave
Bonny St
South St
Iowa St
21.50
21.25

ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700
Scale in Feet

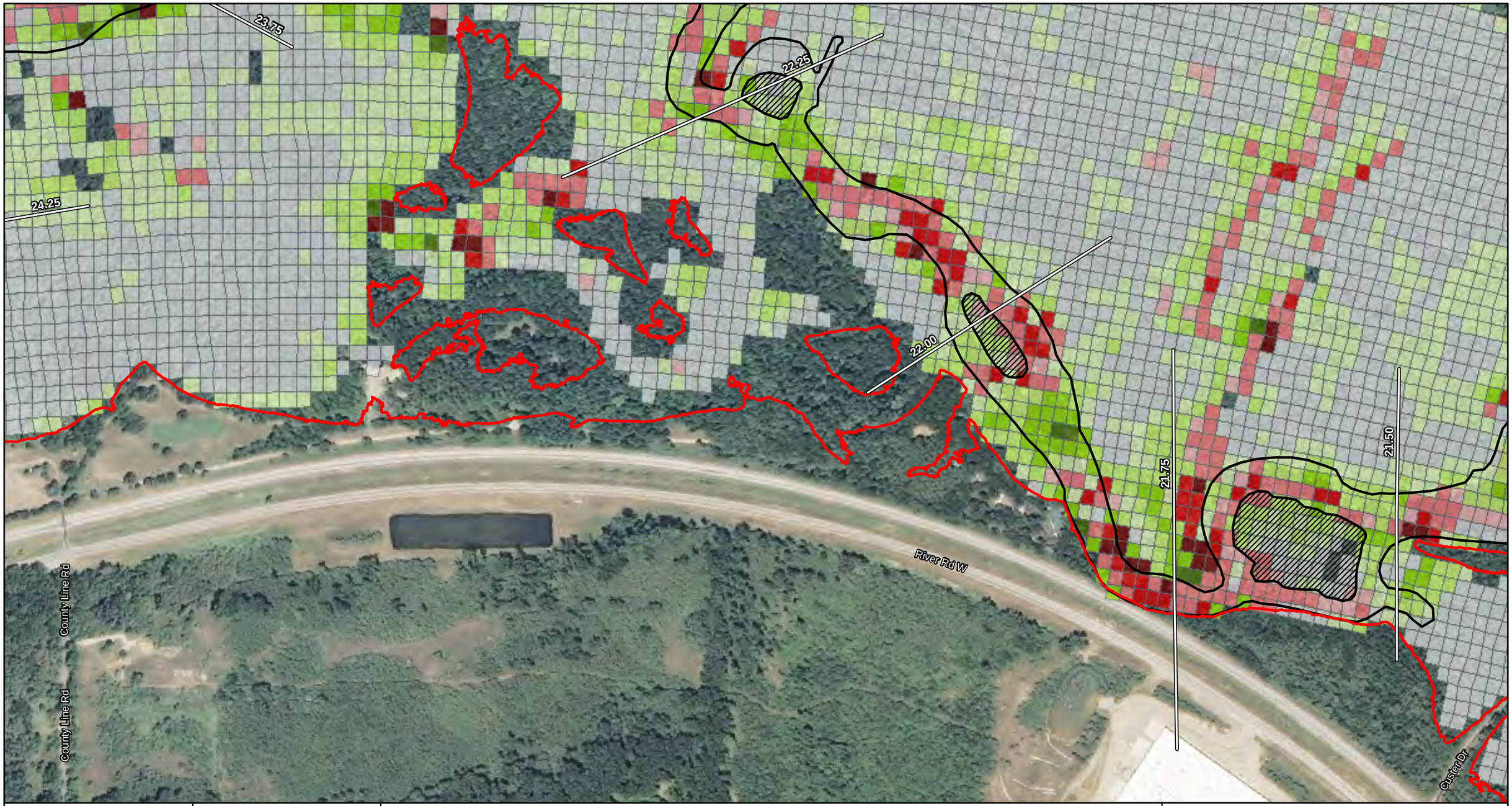
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 21.36 - MP 21.59

SHEET 22 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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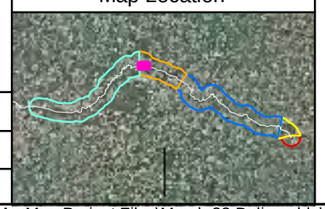
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

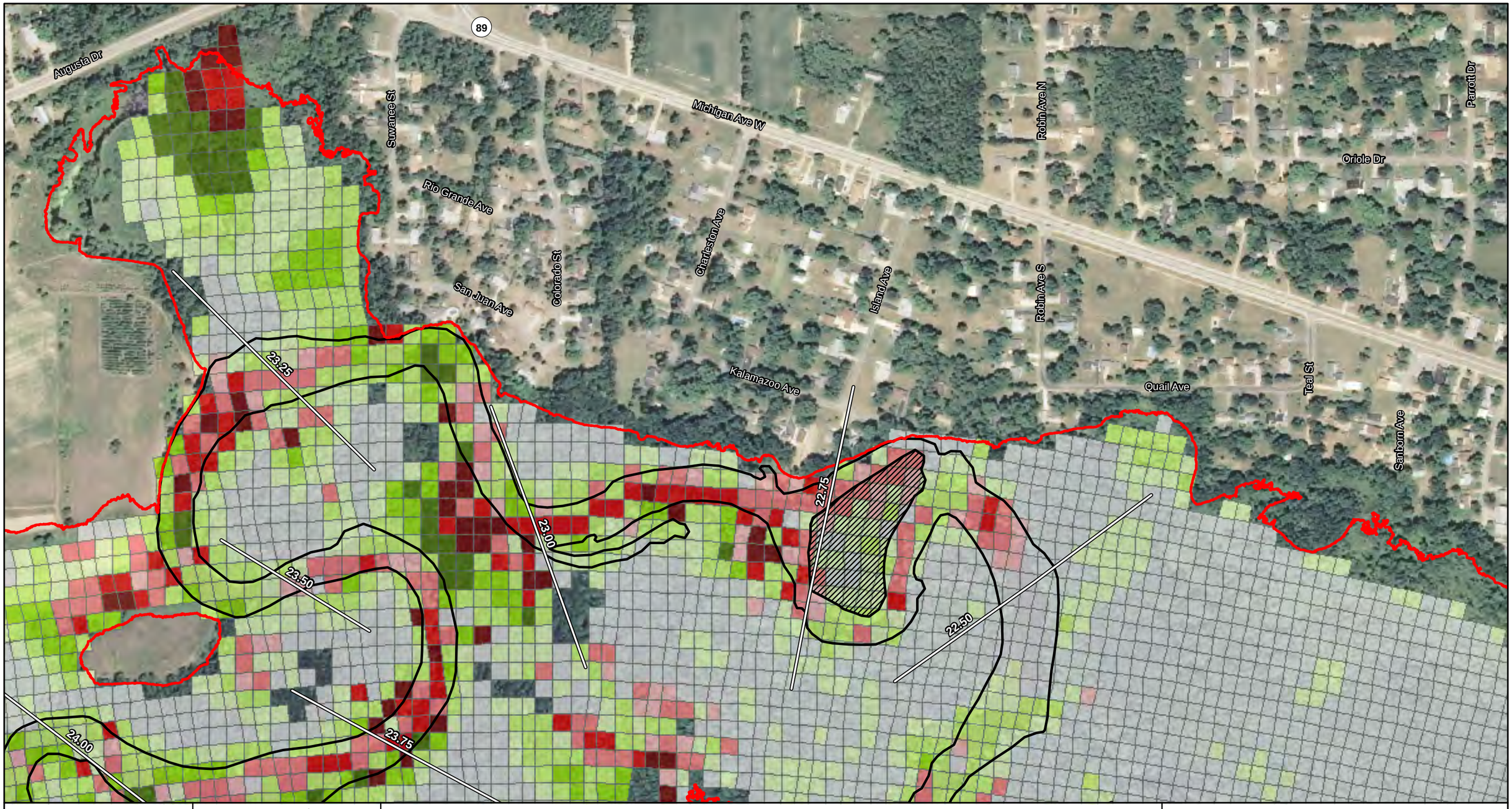
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 21.59 - MP 22.33

SHEET 23 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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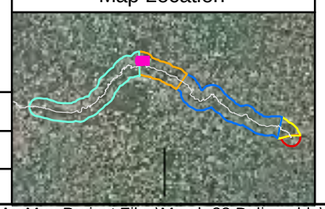
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

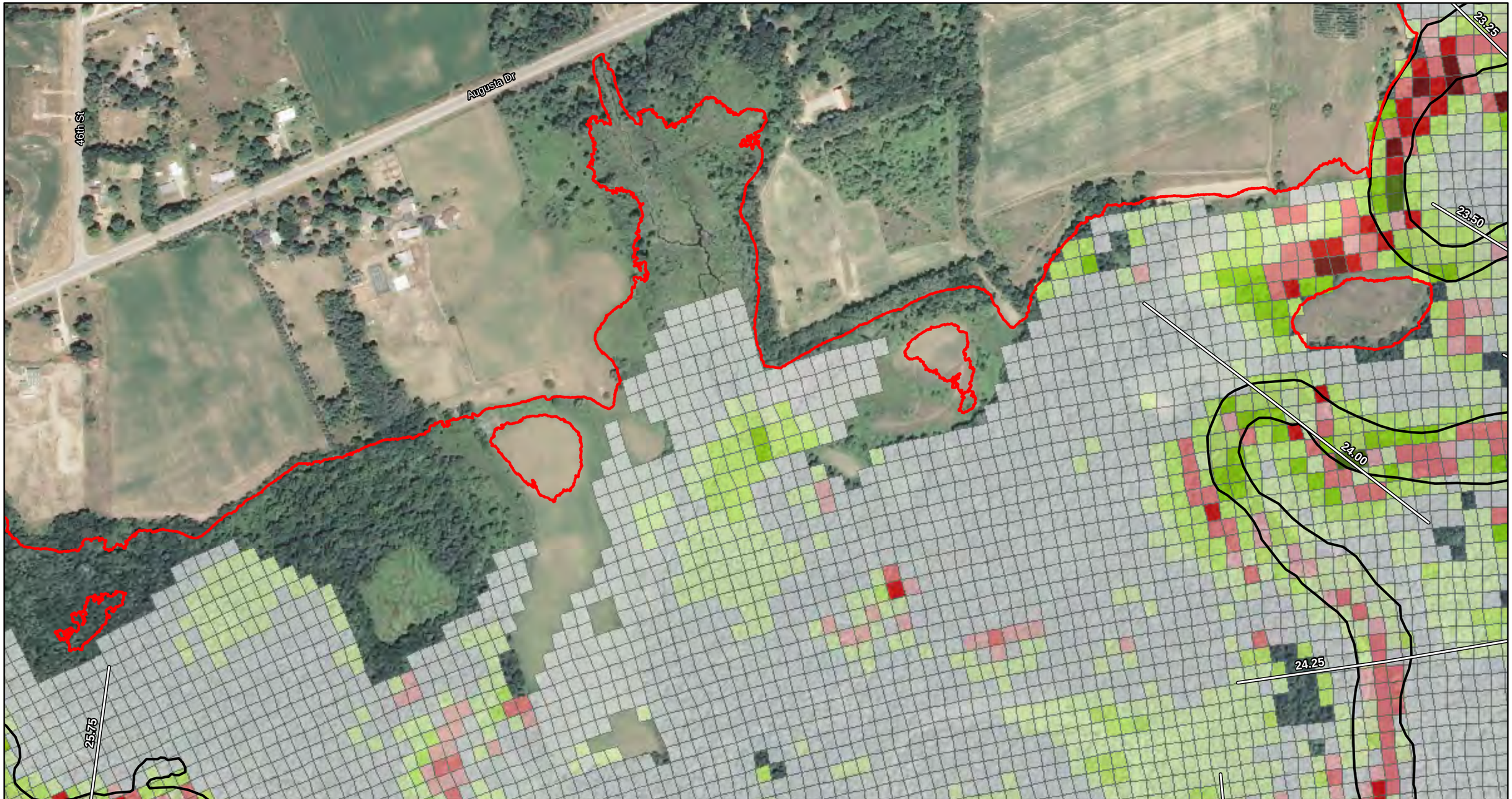
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 22.33 - MP 24.01

SHEET 24 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

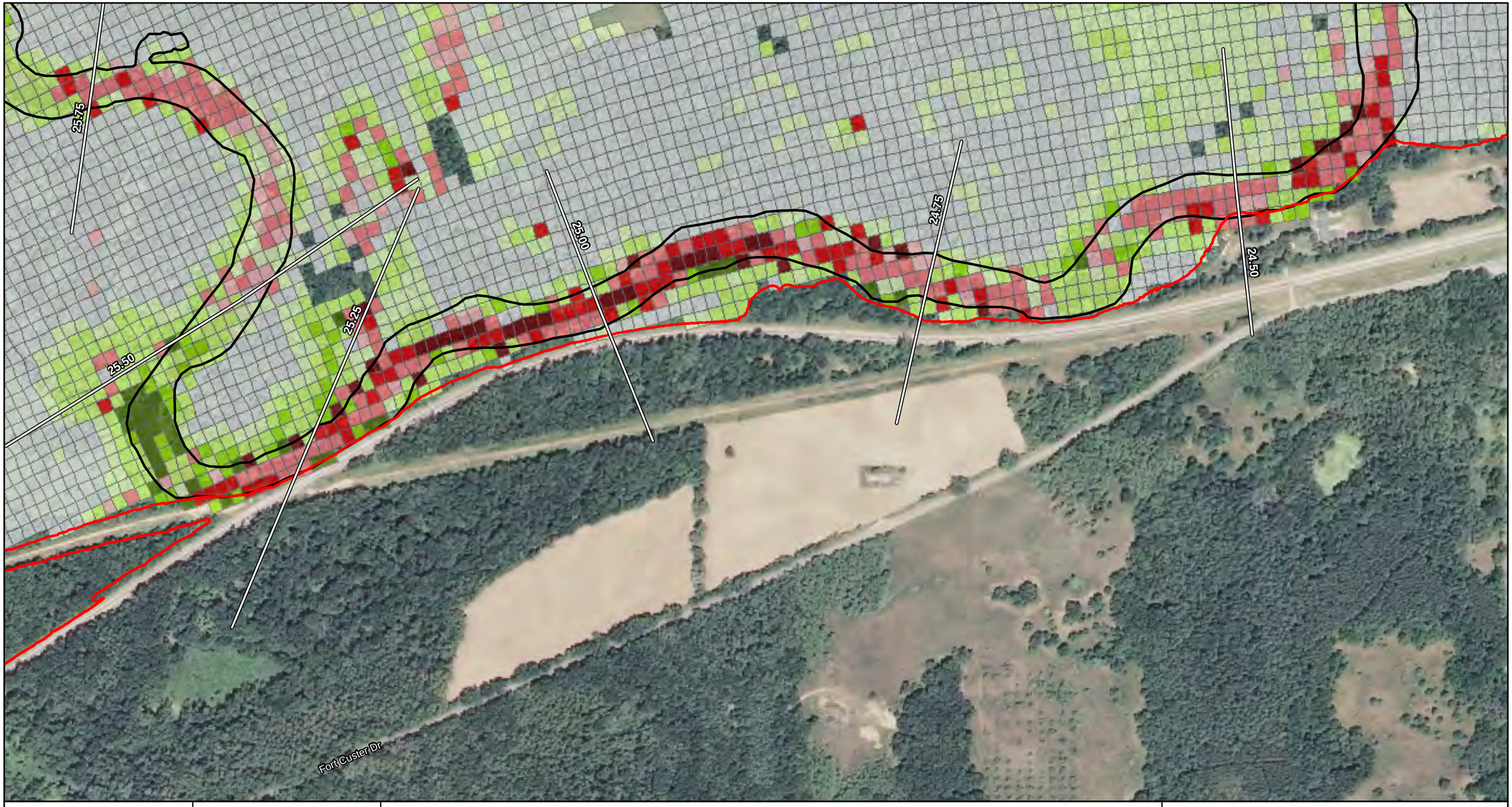
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 24.01 - MP 24.33

SHEET 25 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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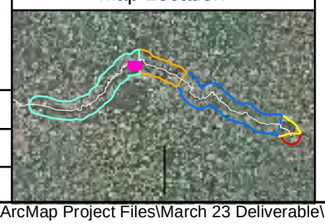
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

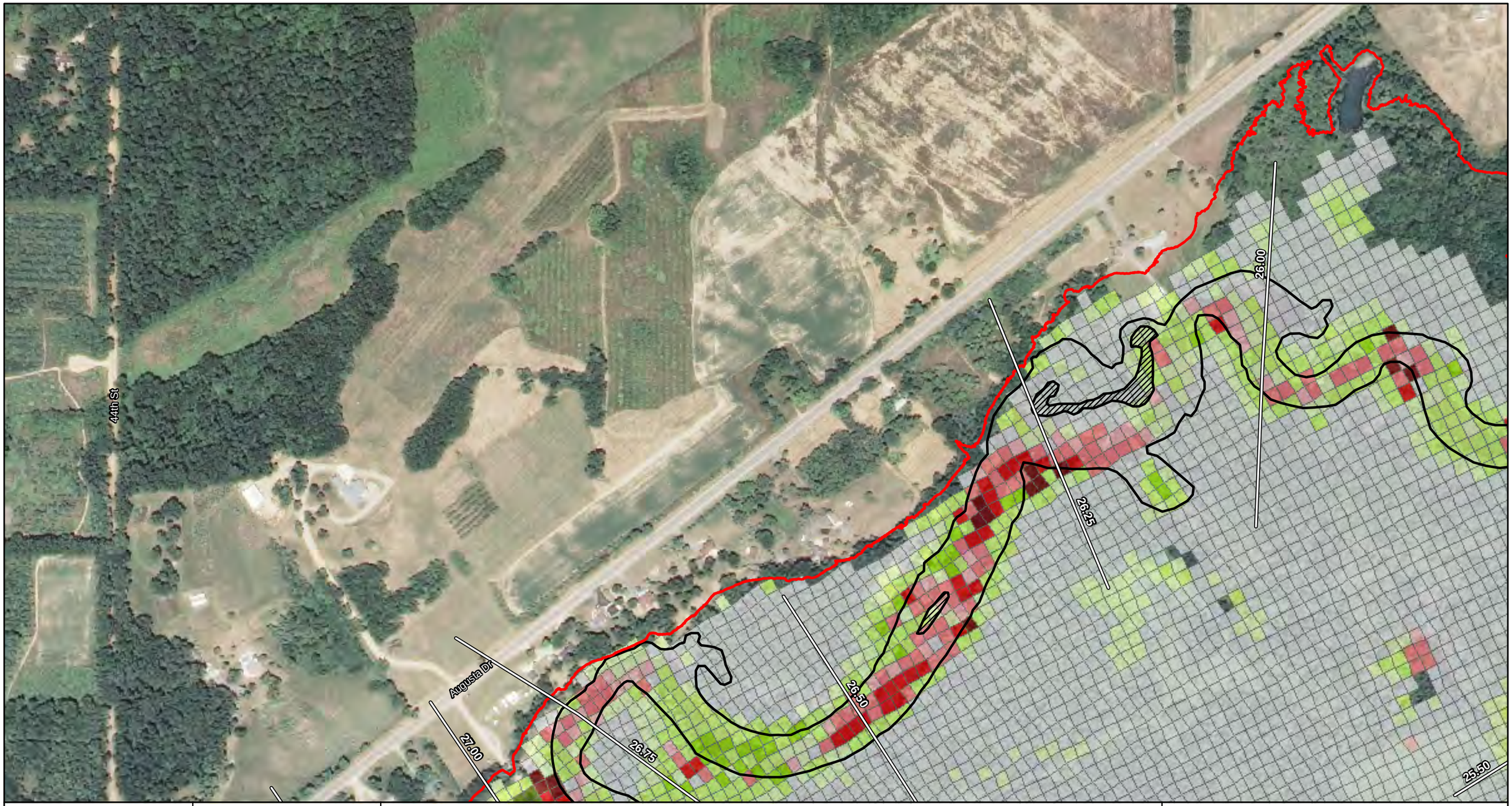
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 24.33 - MP 25.79

SHEET 26 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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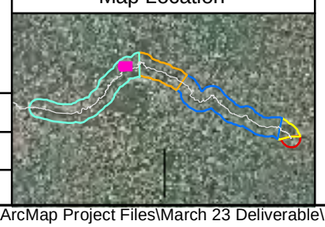
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

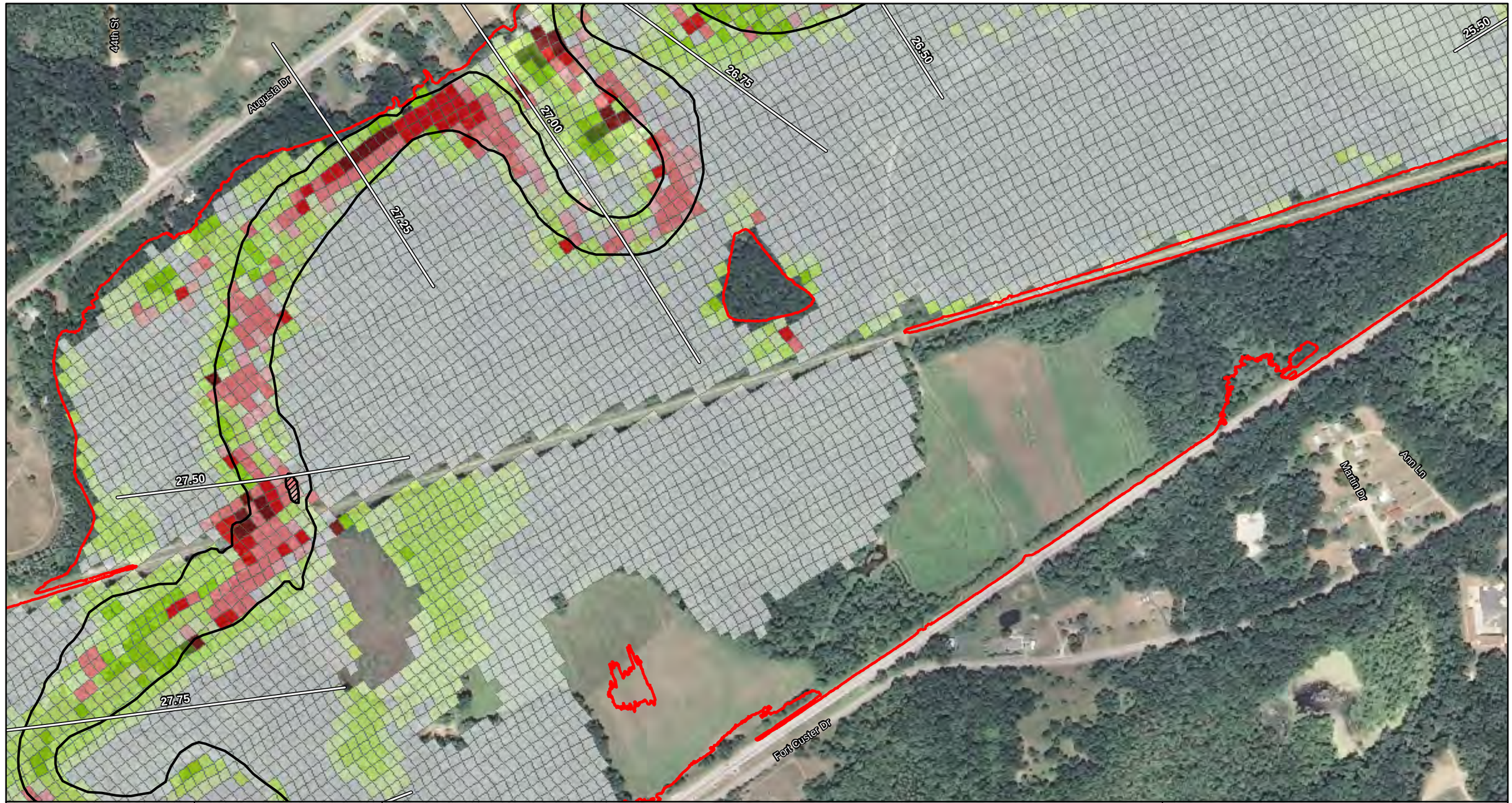
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 25.79 - MP 26.80

SHEET 27 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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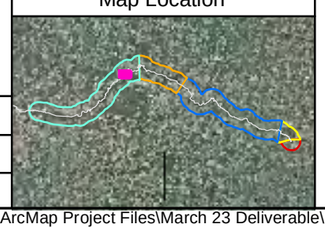
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 26.80 - MP 27.80

SHEET 28 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 27.80NW - MP 28.22NW

SHEET 29 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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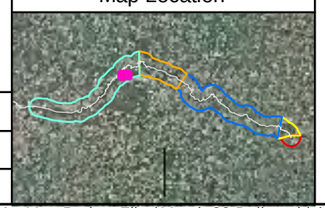
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

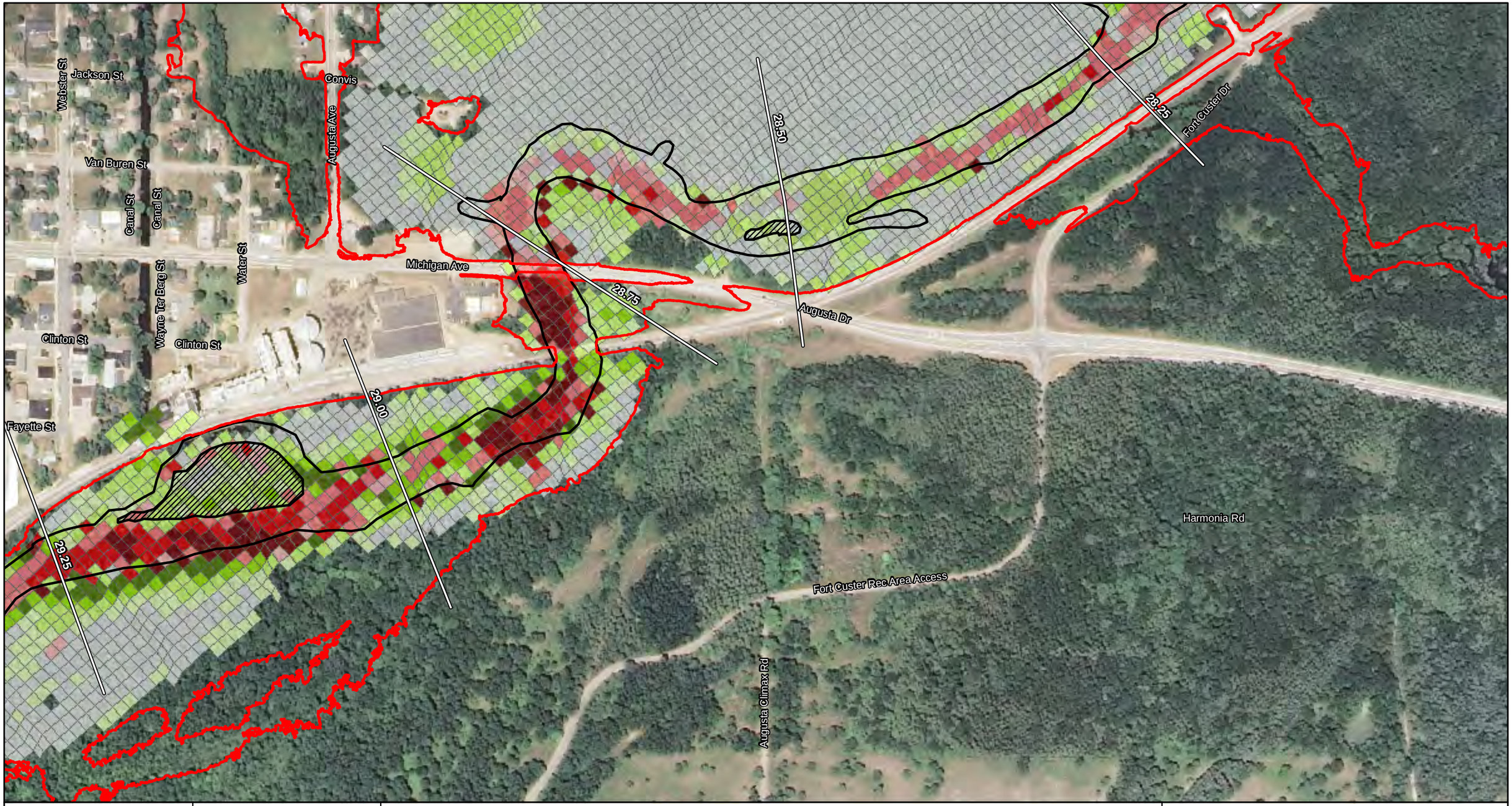
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 27.80SE - MP 28.22SE

SHEET 30 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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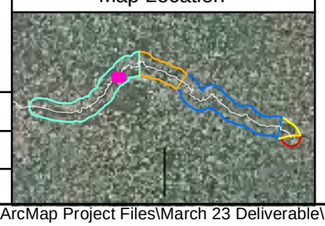
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

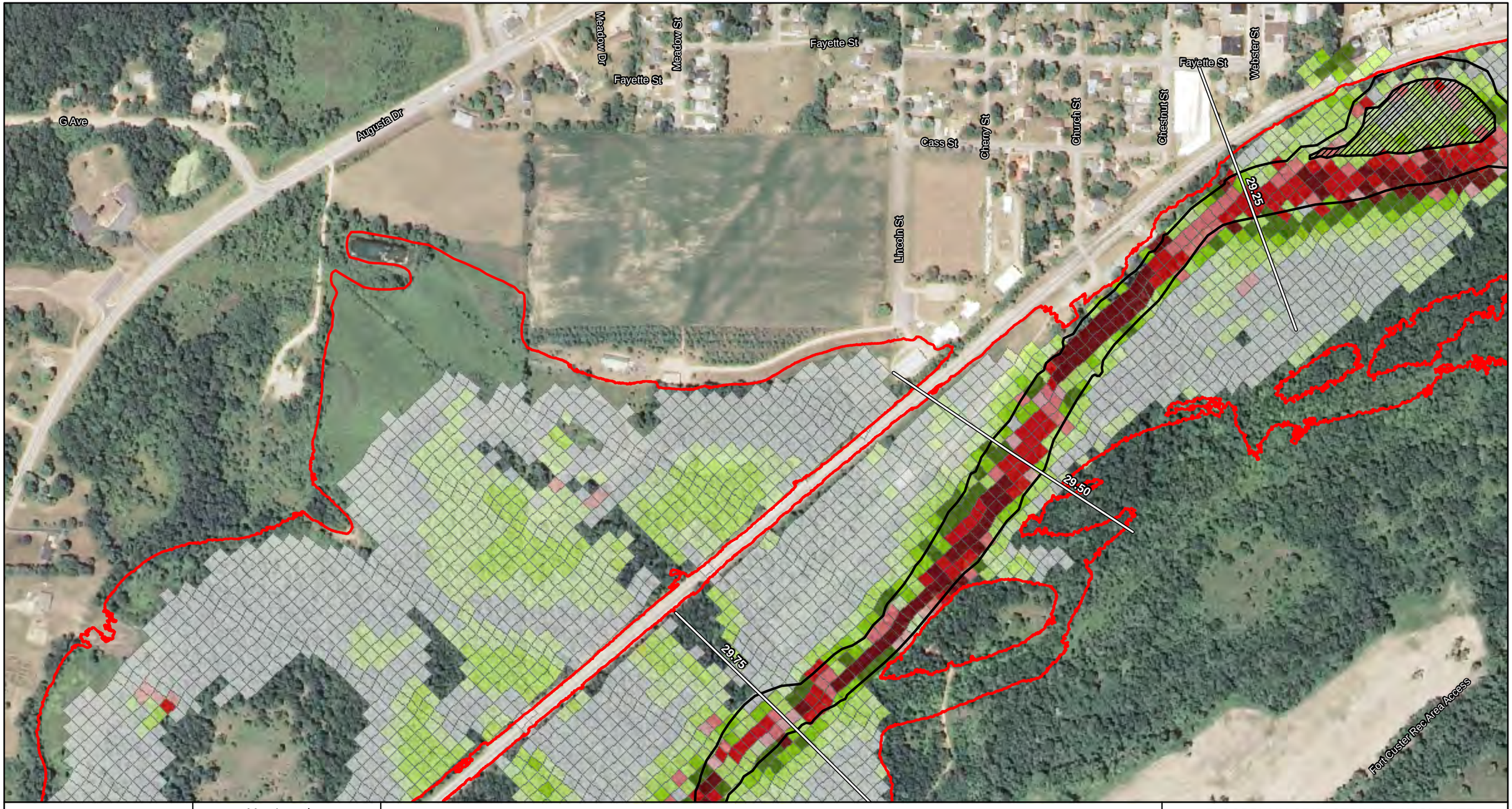
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 28.22 - MP 29.20

SHEET 31 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 29.20 - MP 29.82

SHEET 32 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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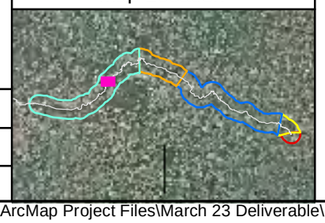
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 29.82 - MP 30.84

SHEET 33 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Sedimentation_Rate_May-June_2011.mxd

Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

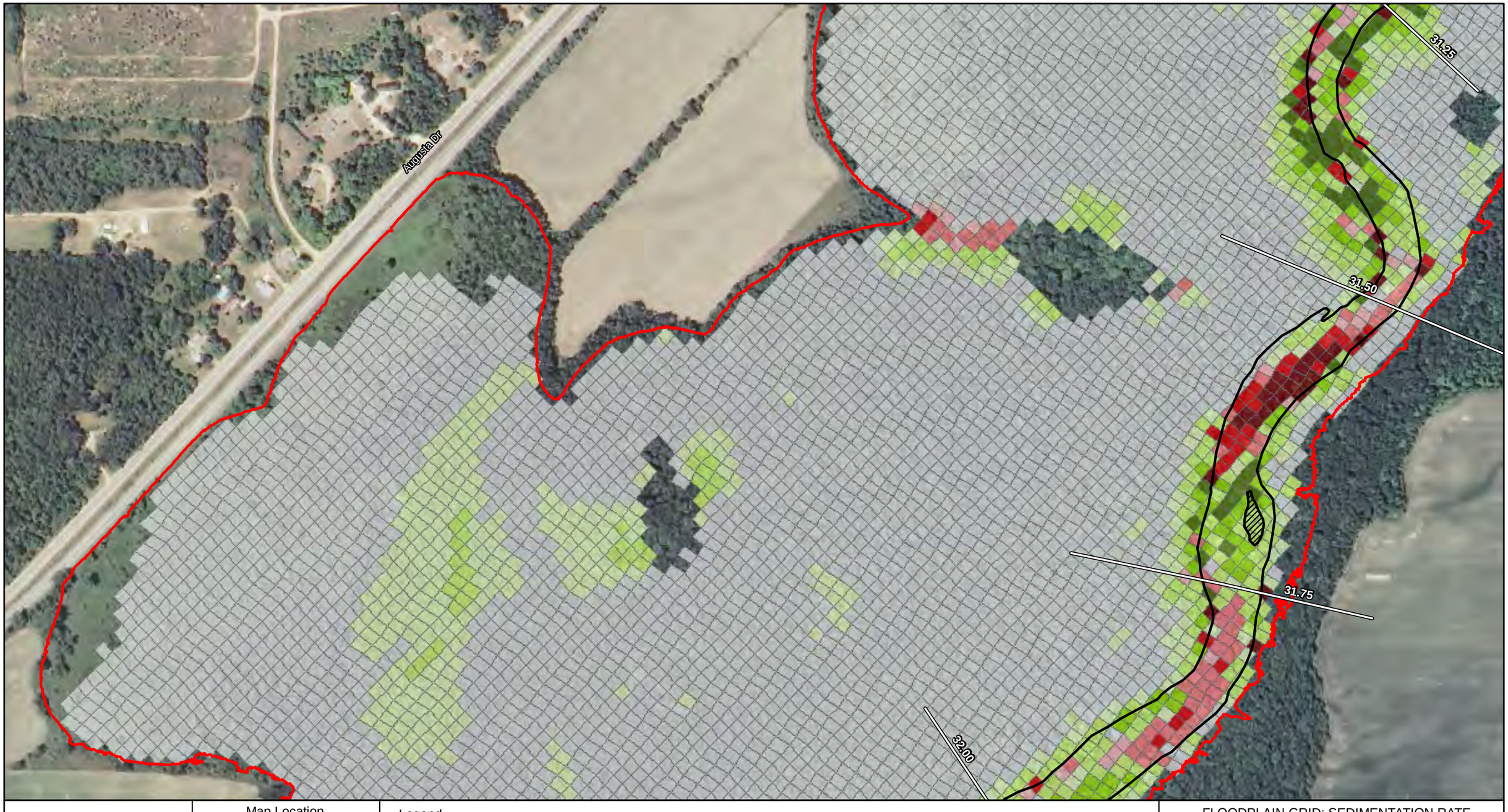
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 30.84 - MP 31.40

SHEET 34 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

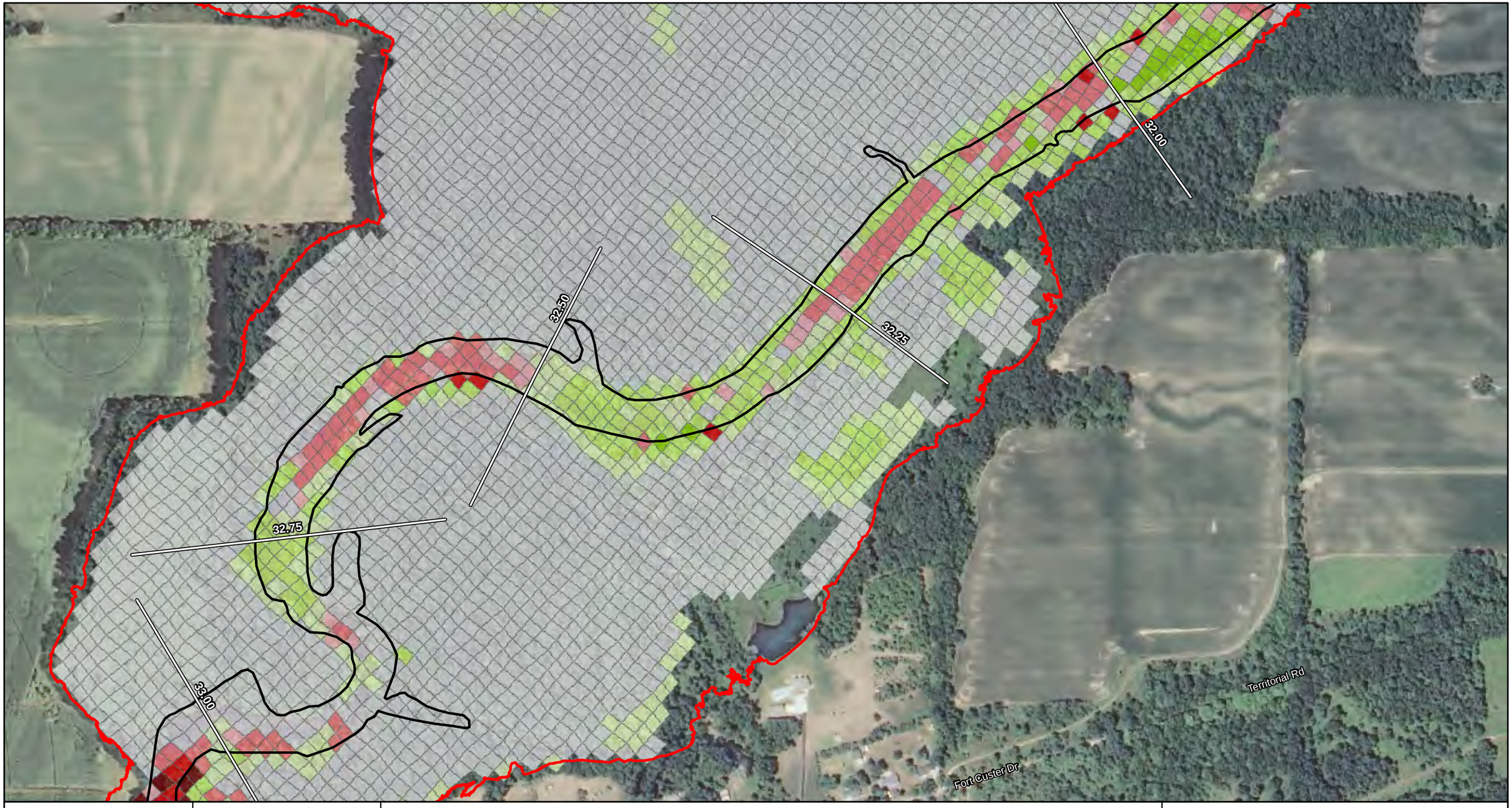
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 31.40 - MP 31.94

SHEET 35 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Sedimentation_Rate_May-June_2011.mxd

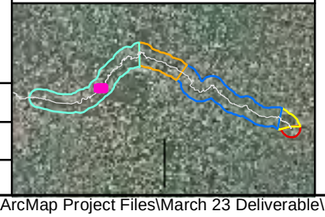
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 31.94 - MP 33.00

SHEET 36 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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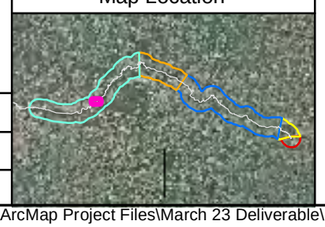
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

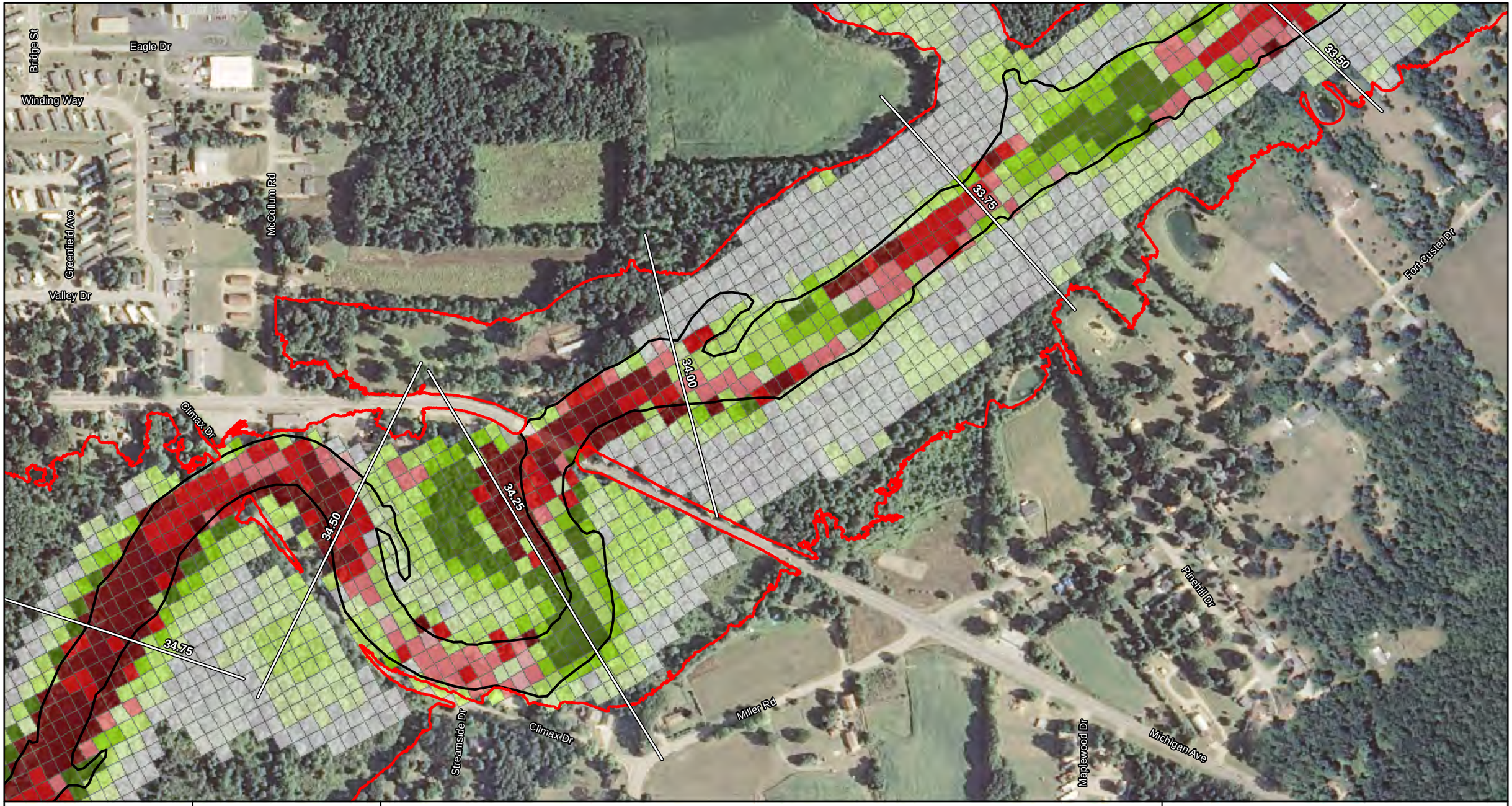
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 33.00 - MP 33.52

SHEET 37 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Sedimentation_Rate_May-June_2011.mxd

Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

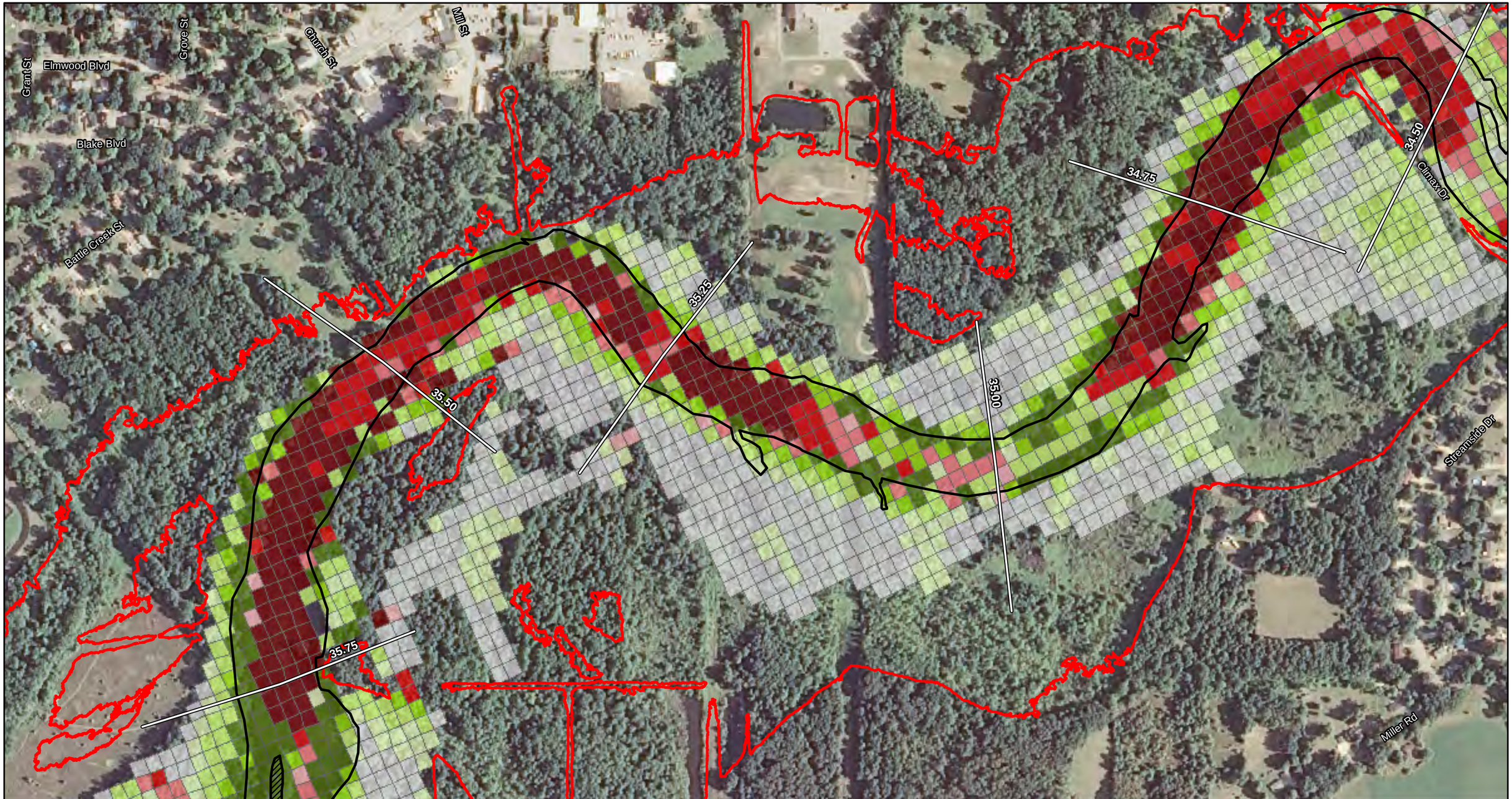
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 33.52 - MP 34.70

SHEET 38 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Sedimentation_Rate_May-June_2011.mxd

Aerial Photography Date: July & August 2009



Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

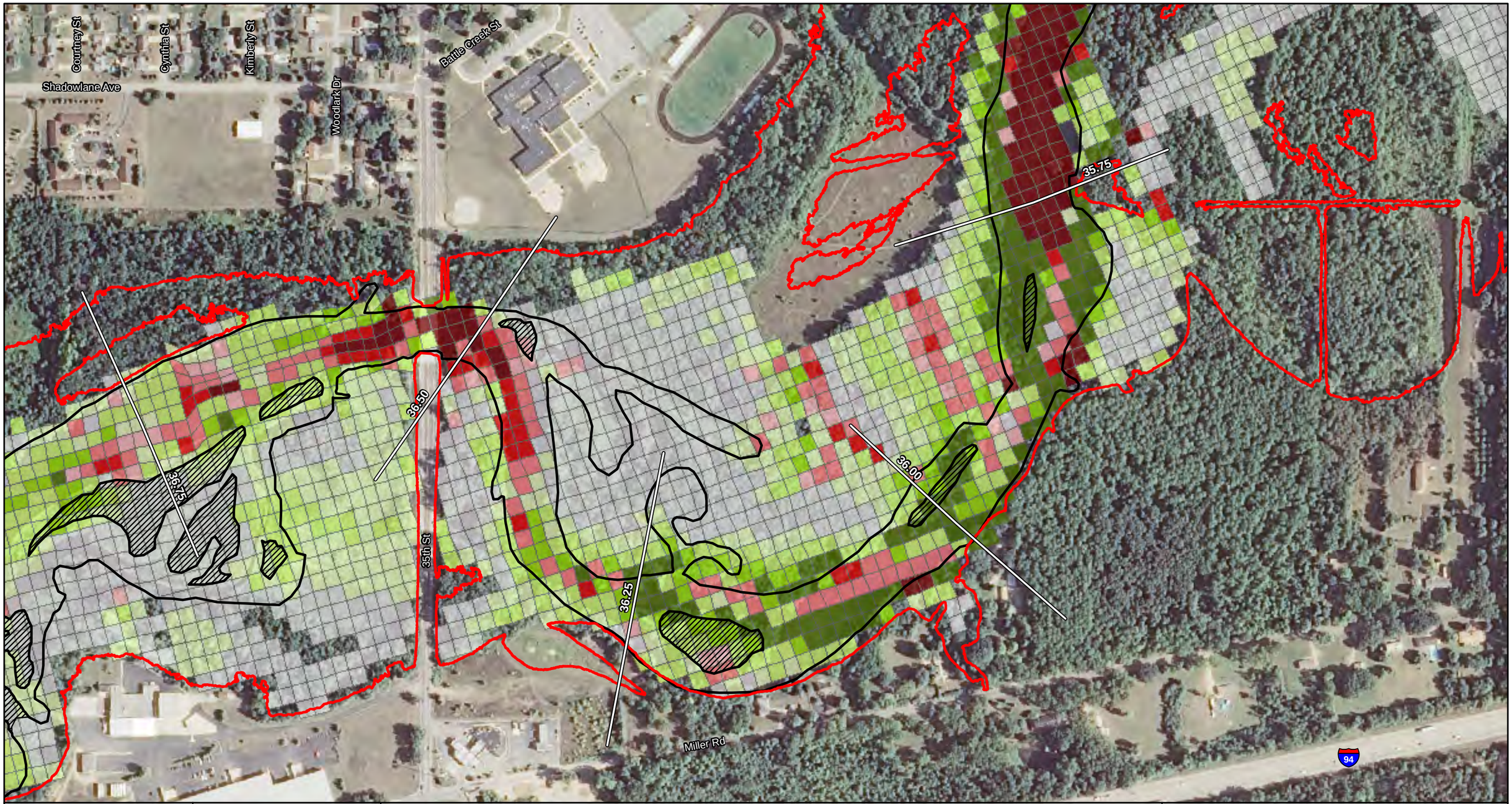
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 34.70 - MP 35.75

SHEET 39 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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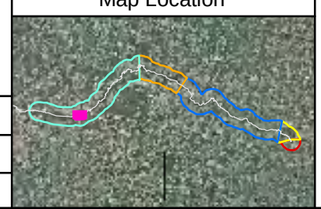
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

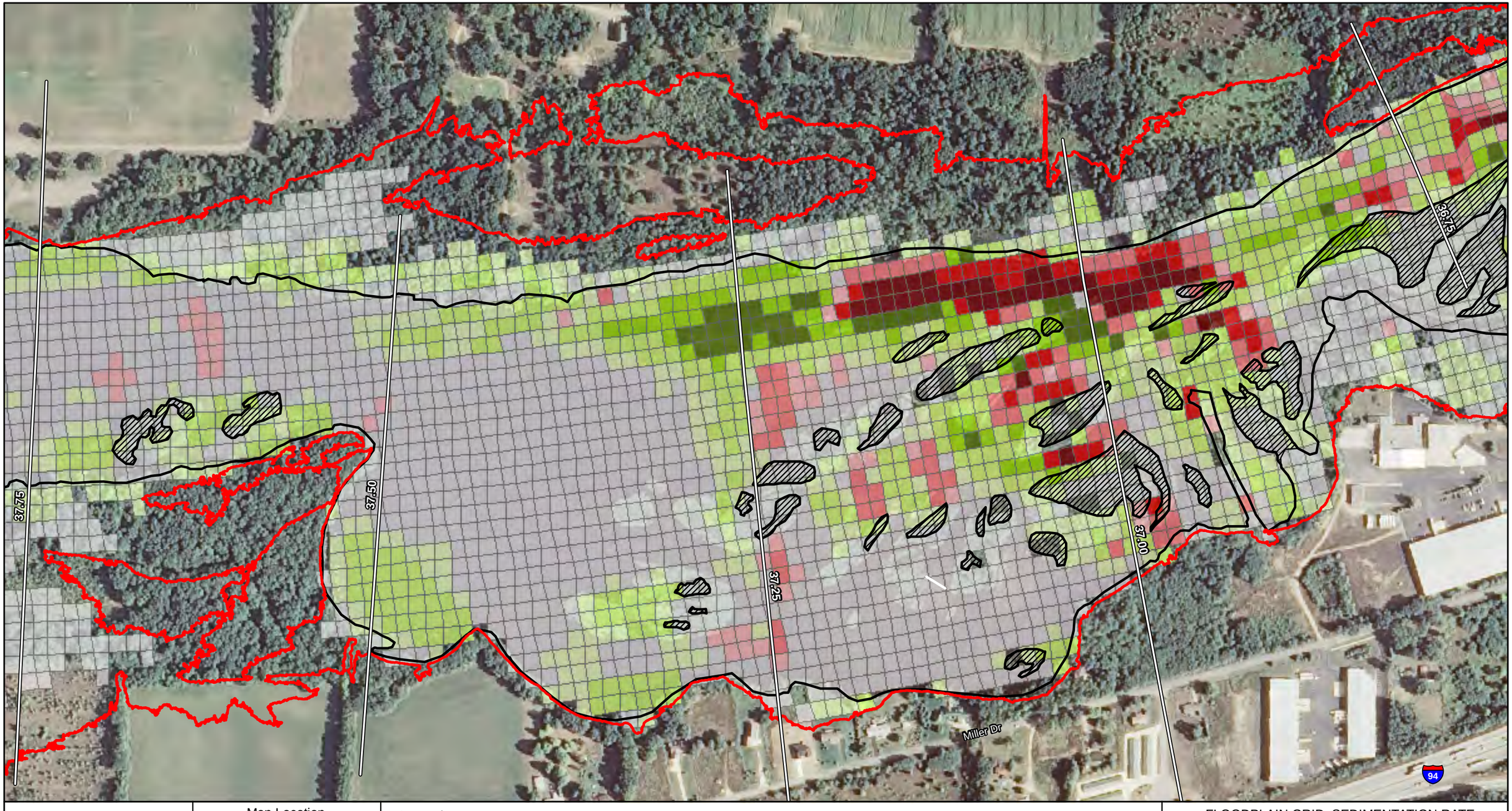
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 35.75 - MP 36.75

SHEET 40 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Sedimentation_Rate_May-June_2011.mxd

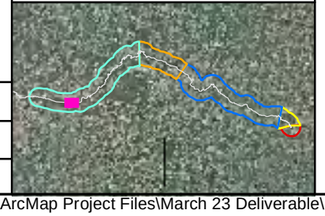
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

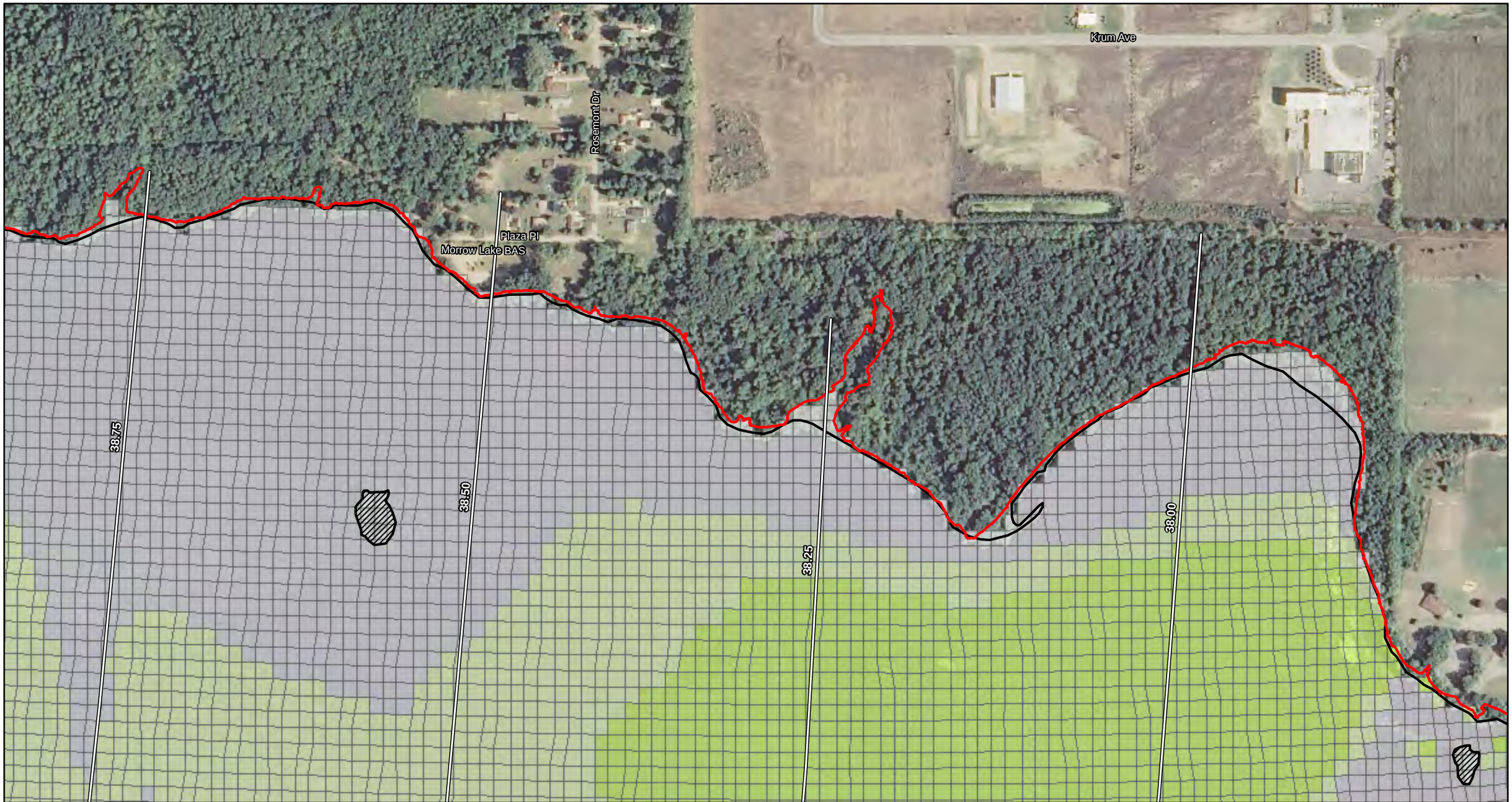
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 36.75 - MP 37.75

SHEET 41 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

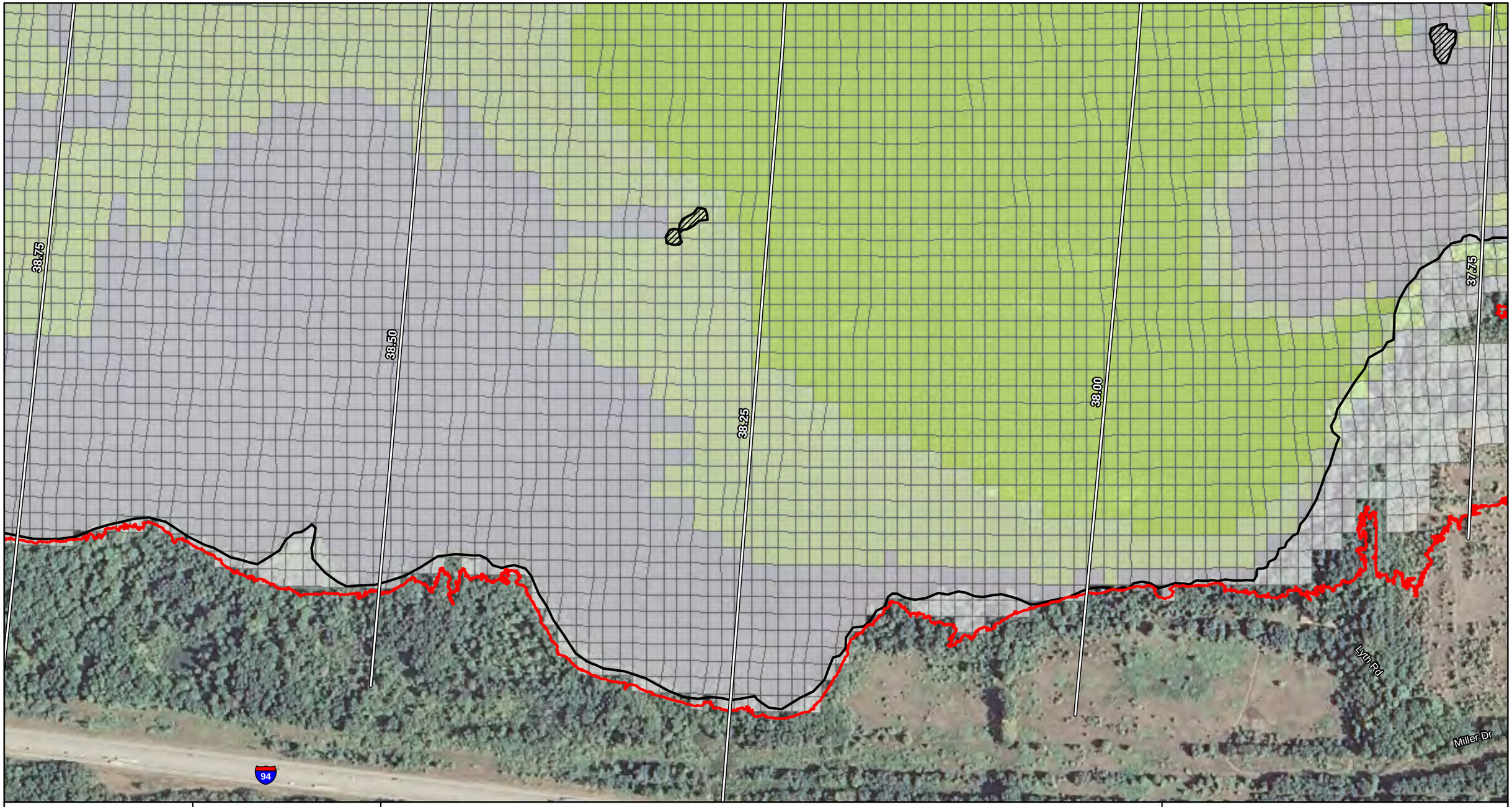
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 37.75N - MP 38.80N

SHEET 42 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Sedimentation_Rate_May-June_2011.mxd

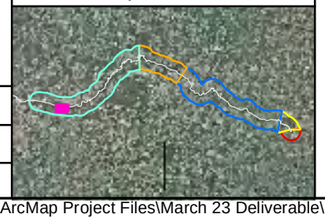
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 37.75S - MP 38.80S

SHEET 43 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Sedimentation_Rate_May-June_2011.mxd

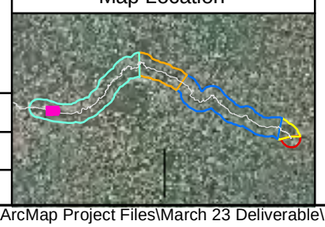
Aerial Photography Date: July & August 2009

Arden Ave
Morrow St
Elliot Rd
Lawndale Ave
Chene Dr
Consumers Power Dr
39.75
39.50
39.25
39.00

ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700
Scale in Feet

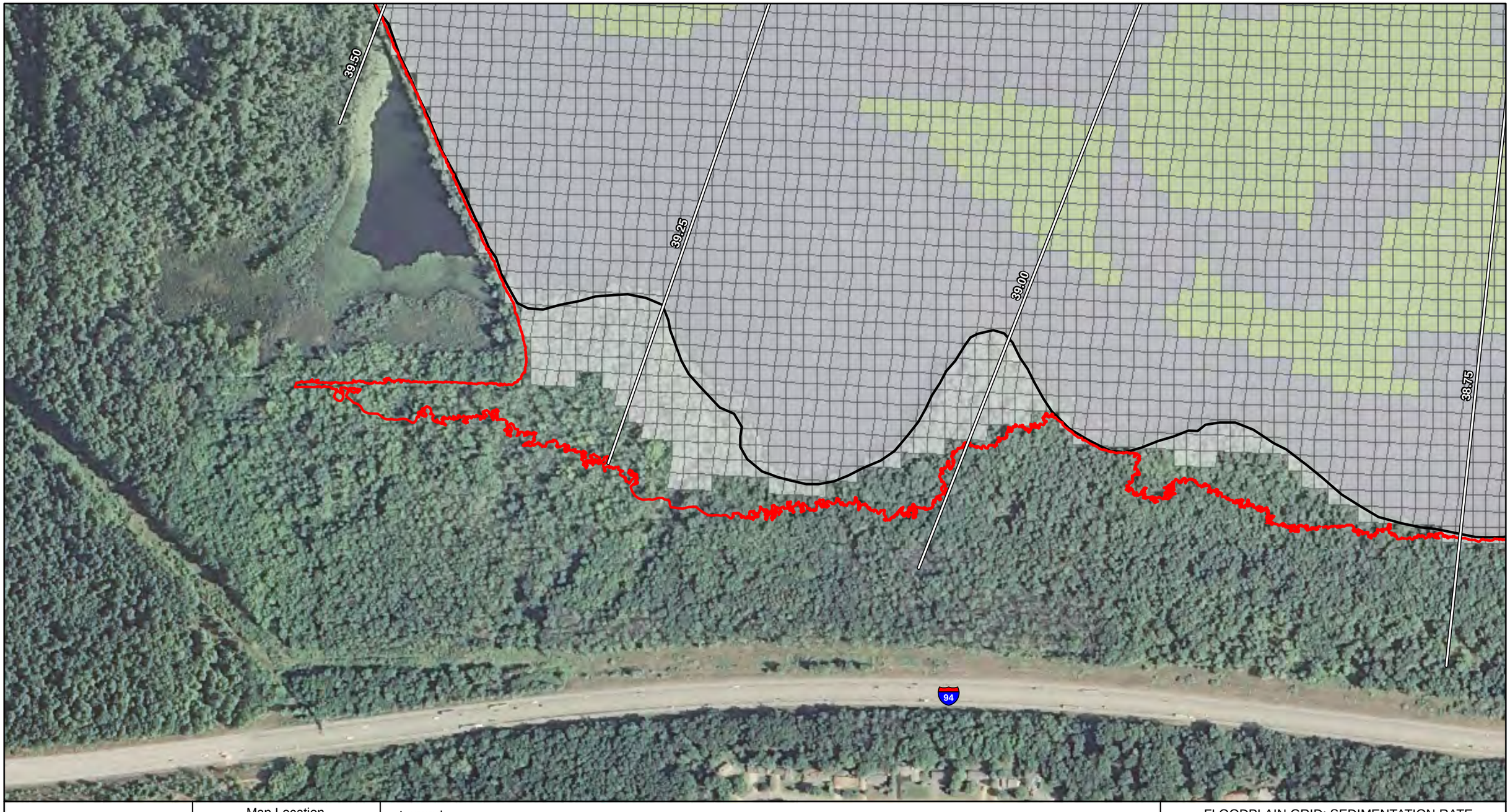
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 38.80N - MP 39.95N

SHEET 44 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Sedimentation_Rate_May-June_2011.mxd

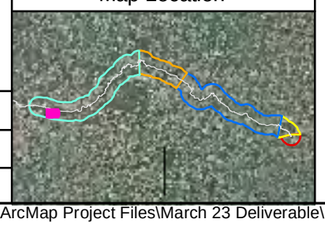
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
MAY 27 - JUNE 3, 2011
MP 38.80S - MP 39.95S

SHEET 45 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Sedimentation_Rate_May-June_2011.mxd

Aerial Photography Date: July & August 2009

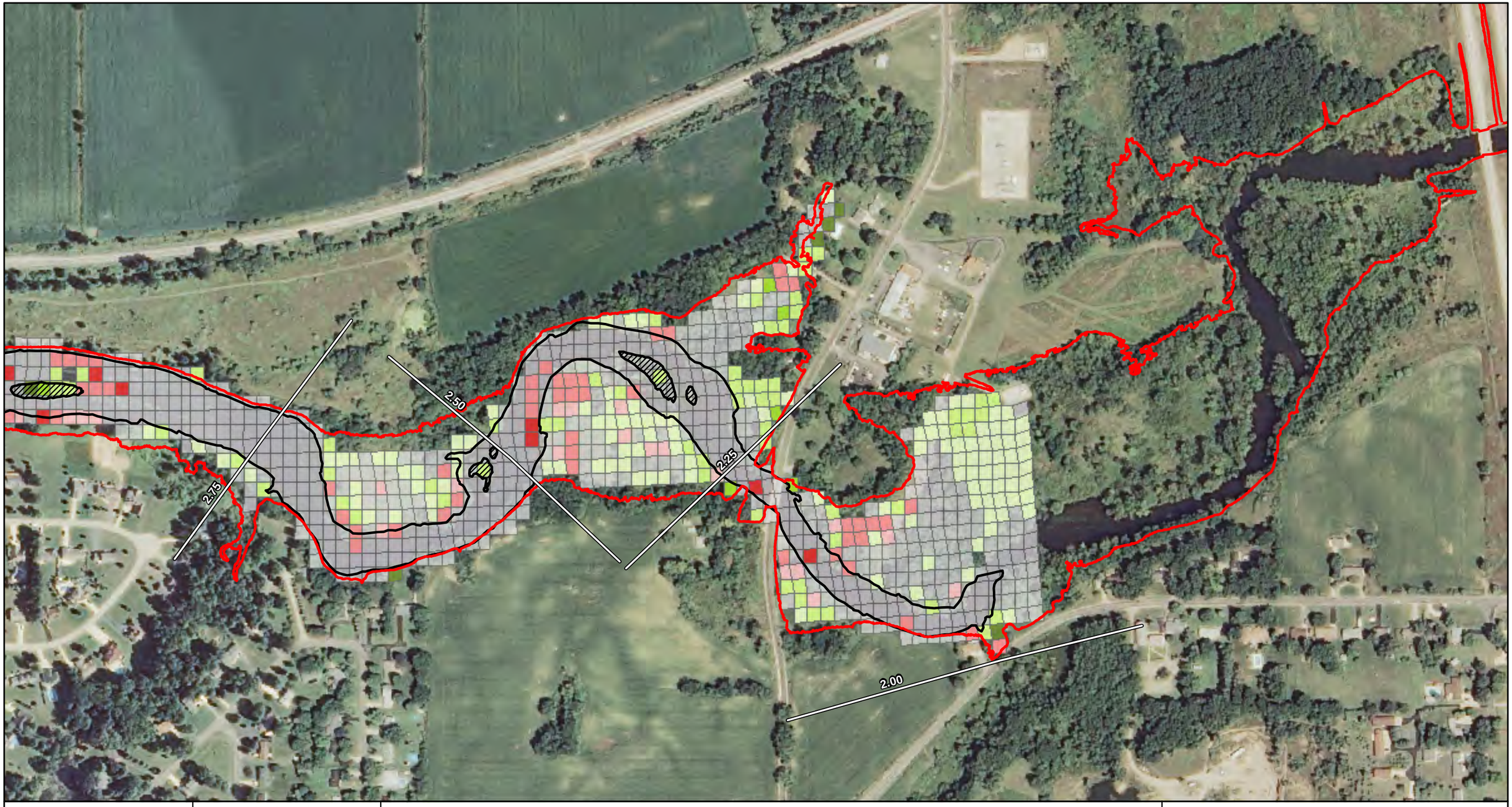
Figure 5-22

Floodplain Grid: Sedimentation Rate

Cells with Net Change in Silt or Clay Mass

May 27 – June 3, 2011

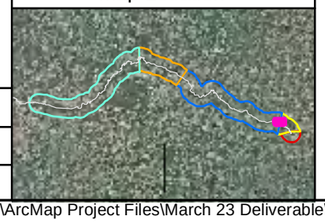
Sheets 1 through 45



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

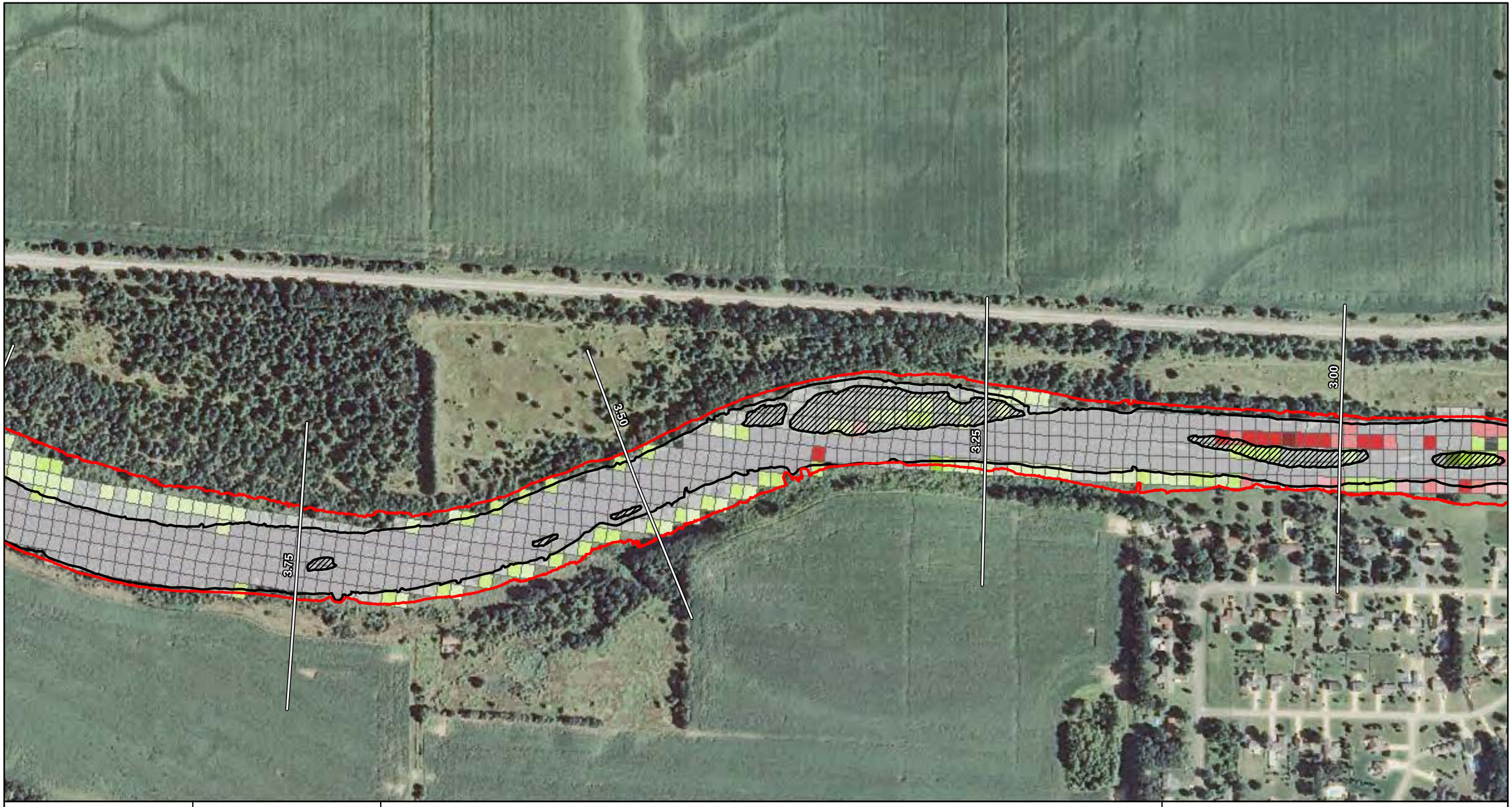
FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 01.88 - MP 02.91

SHEET 1 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Sedimentation_Rate2_May-June_2011.mxd

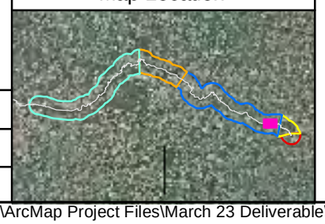
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 02.91 - MP 03.93

SHEET 2 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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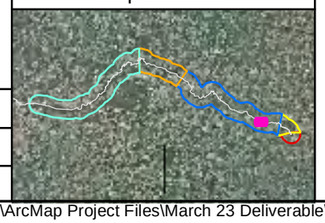
Aerial Photography Date: July & August 2009

5.00
4.75
4.50
4.25
4.00

ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

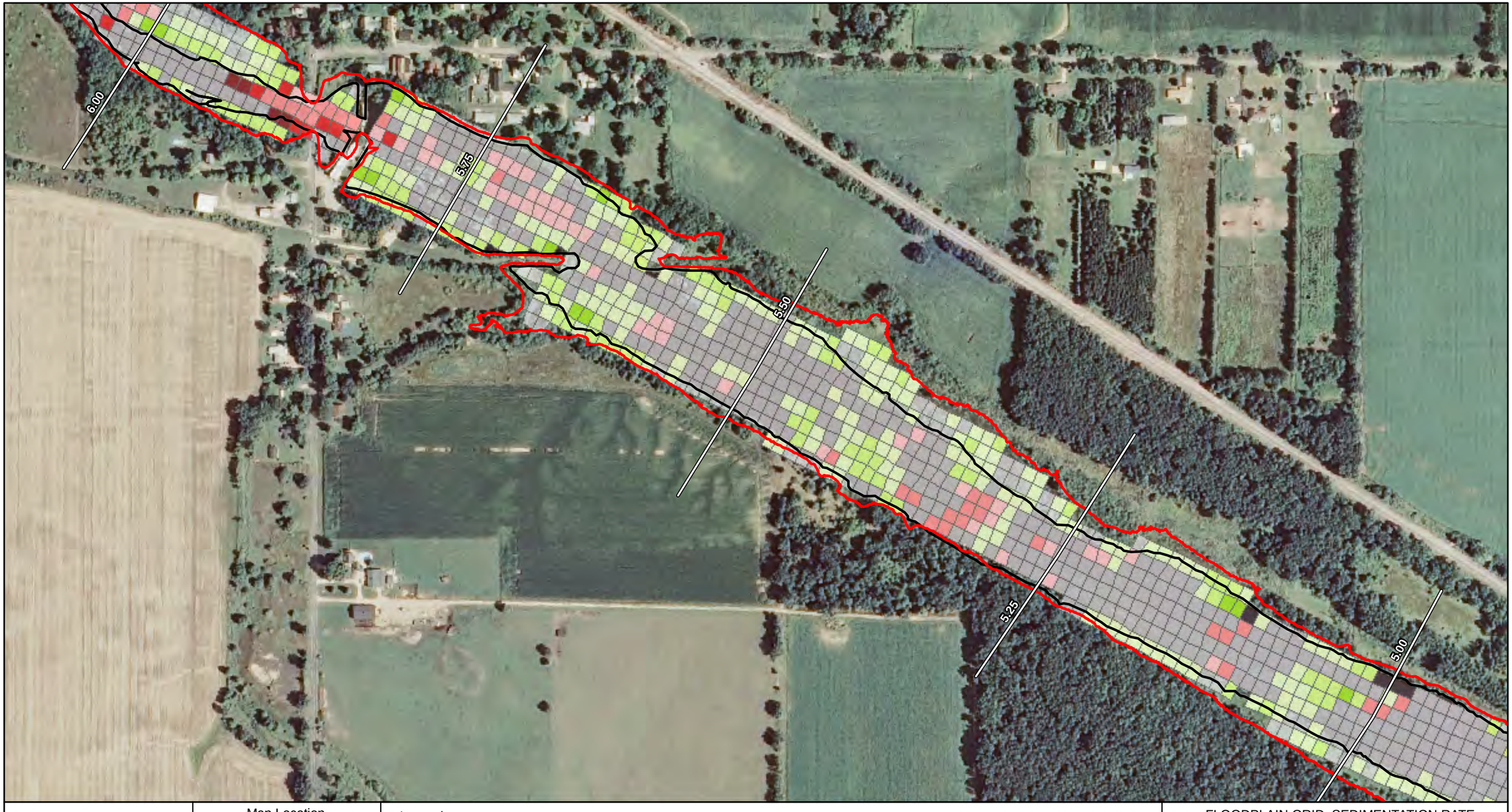
FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 03.93 - MP 04.98

SHEET 3 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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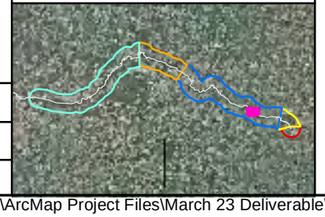
Aerial Photography Date: July & August 2009



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Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

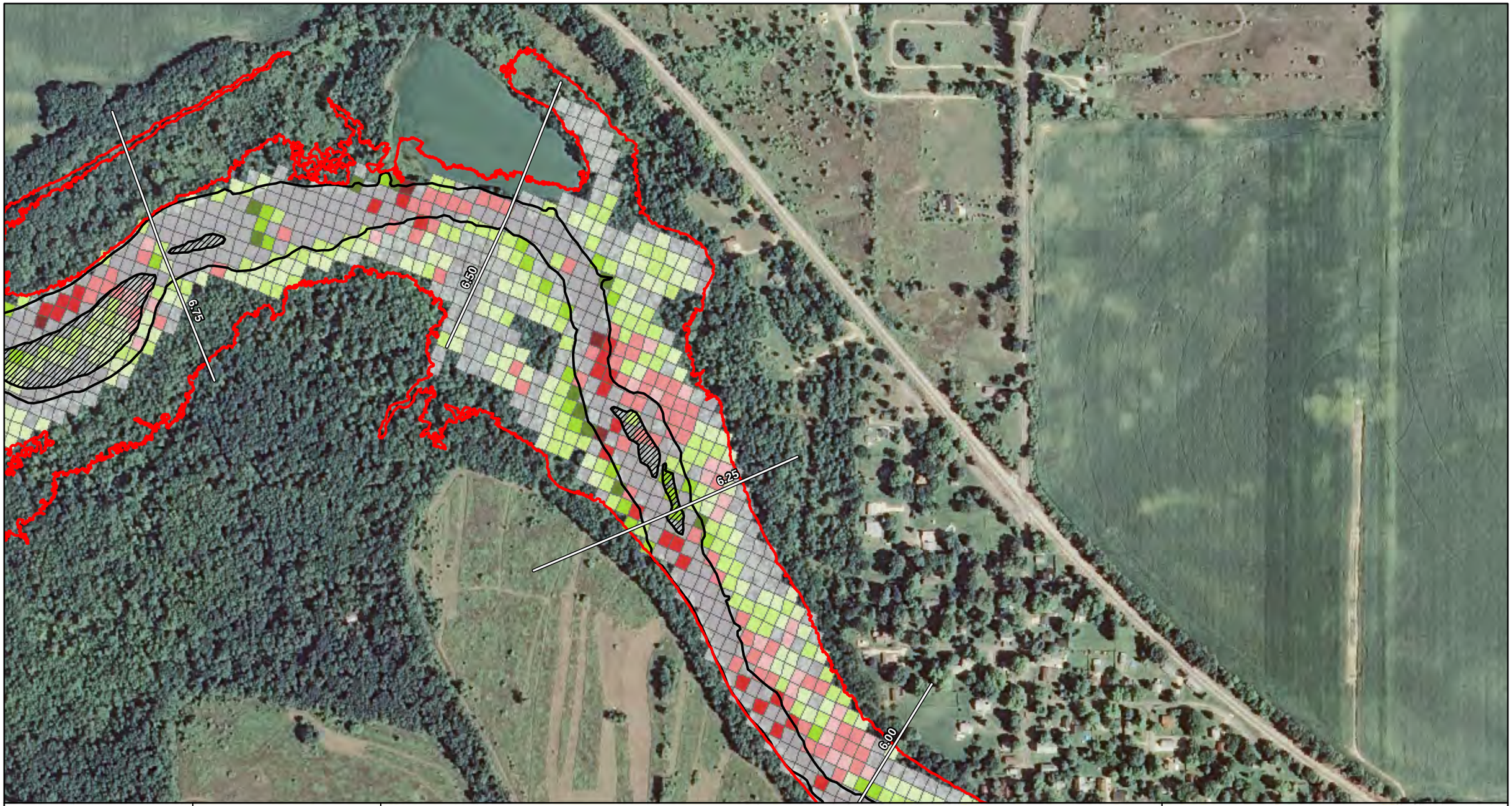
FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 04.98 - MP 06.03

SHEET 4 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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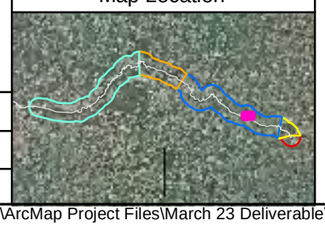
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 06.03 - MP 06.85

SHEET 5 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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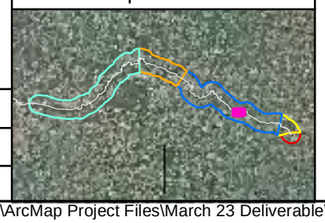
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 06.85 - MP 07.95

SHEET 6 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

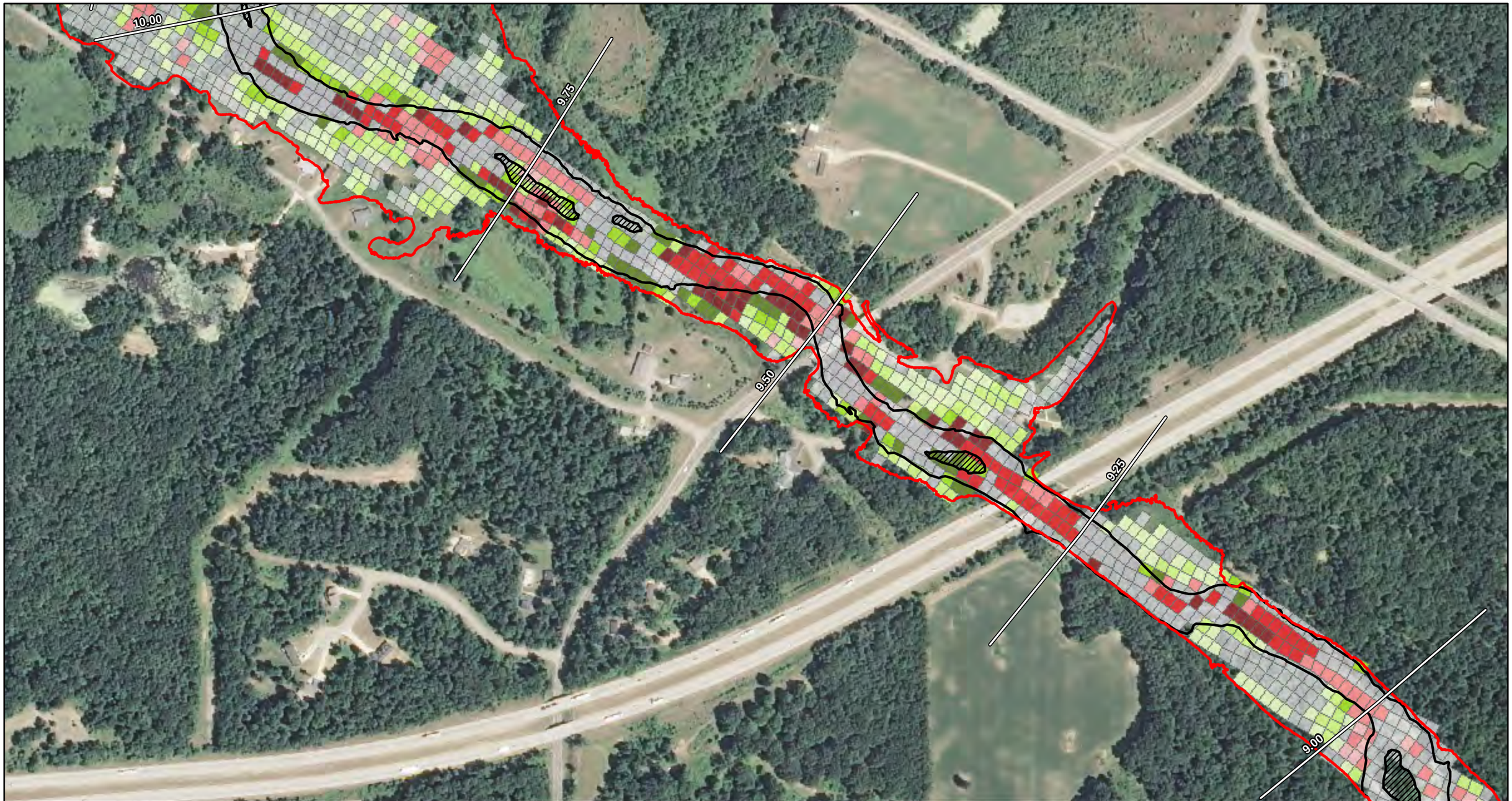
FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 07.95 - MP 08.93

SHEET 7 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

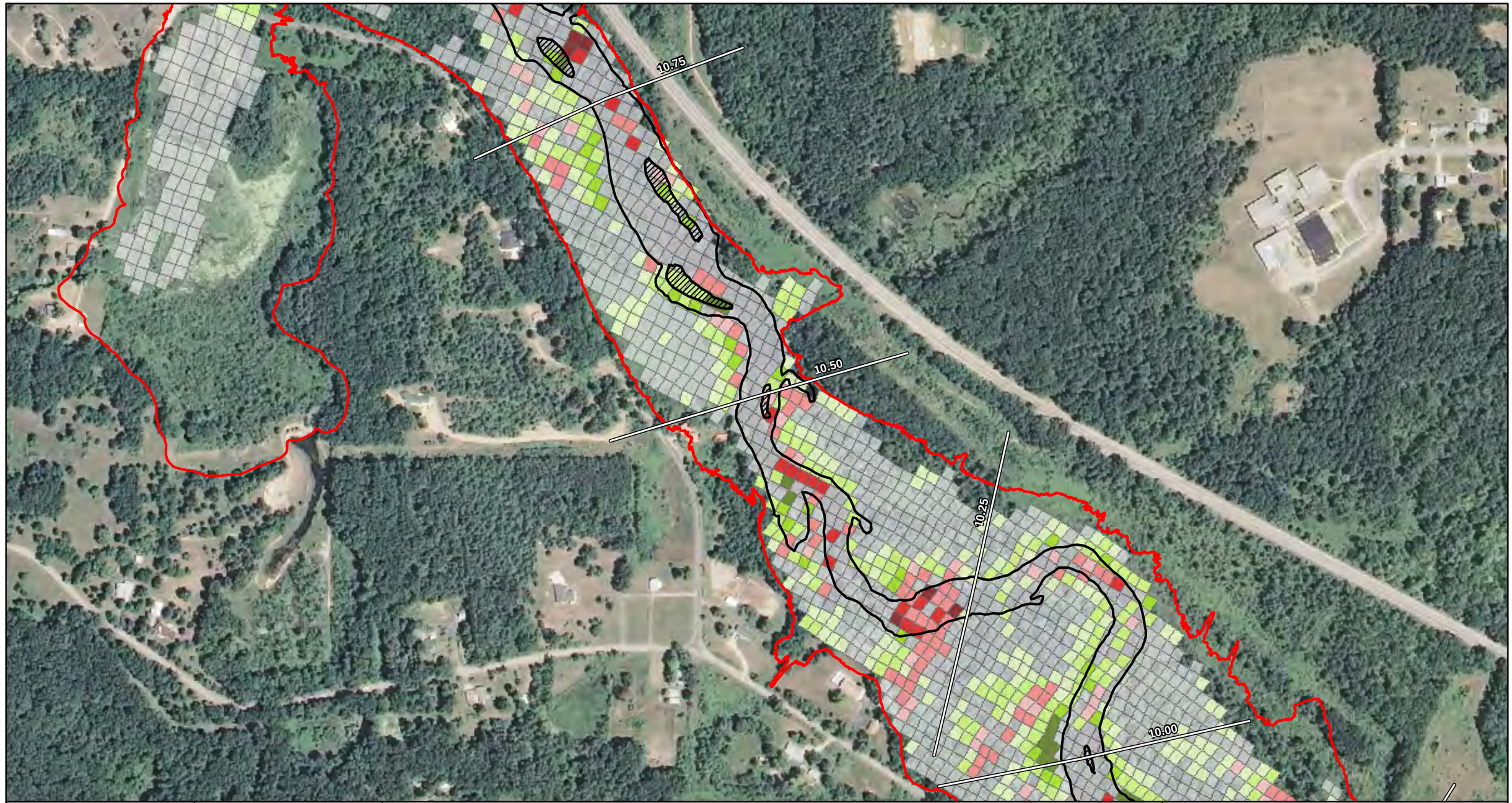
FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 08.93 - MP 10.00

SHEET 8 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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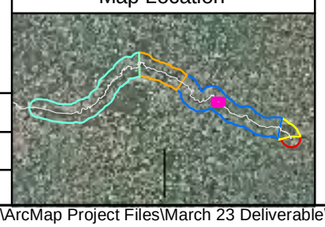
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

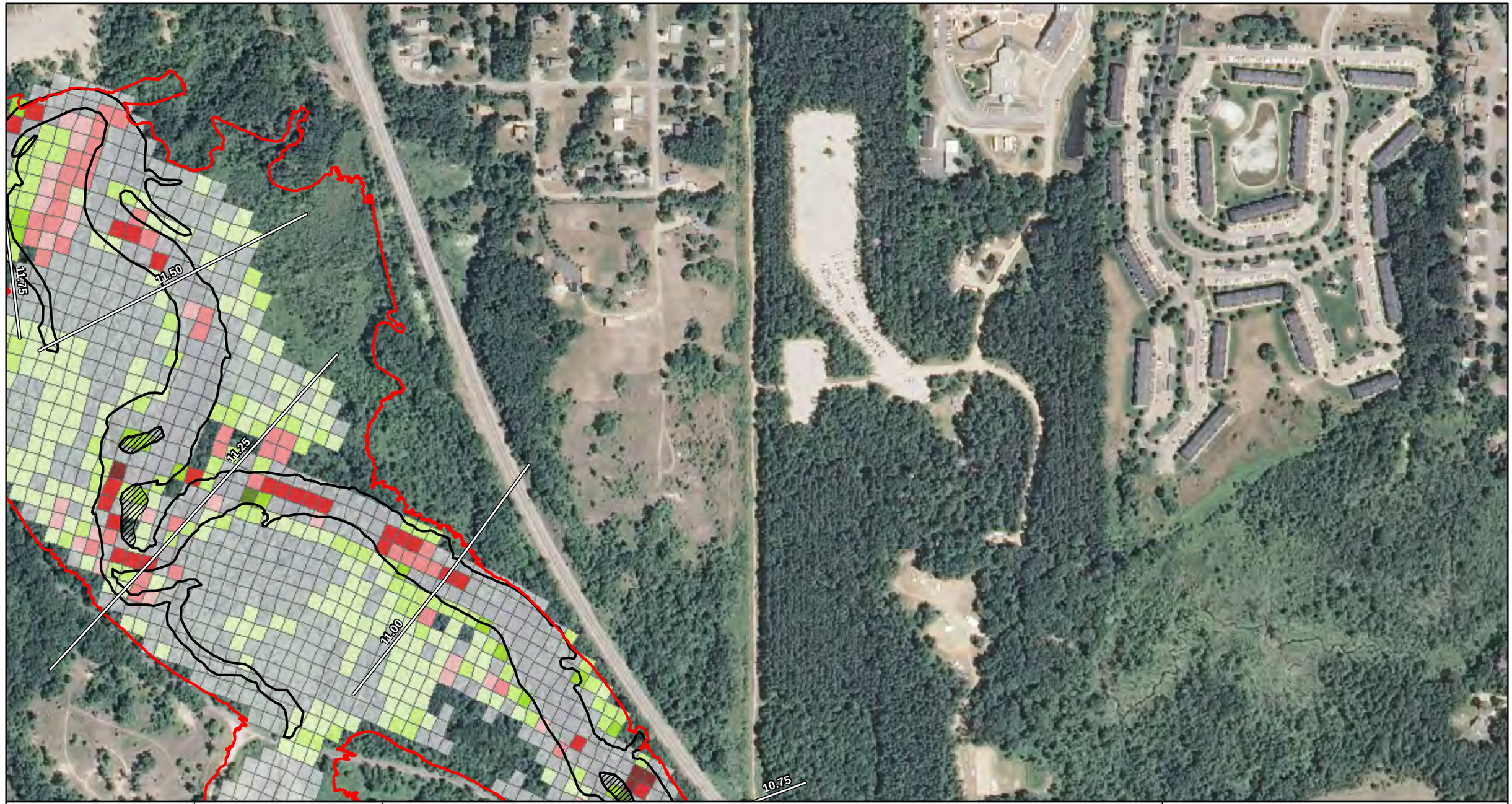
FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 10.00 - MP 10.80

SHEET 9 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

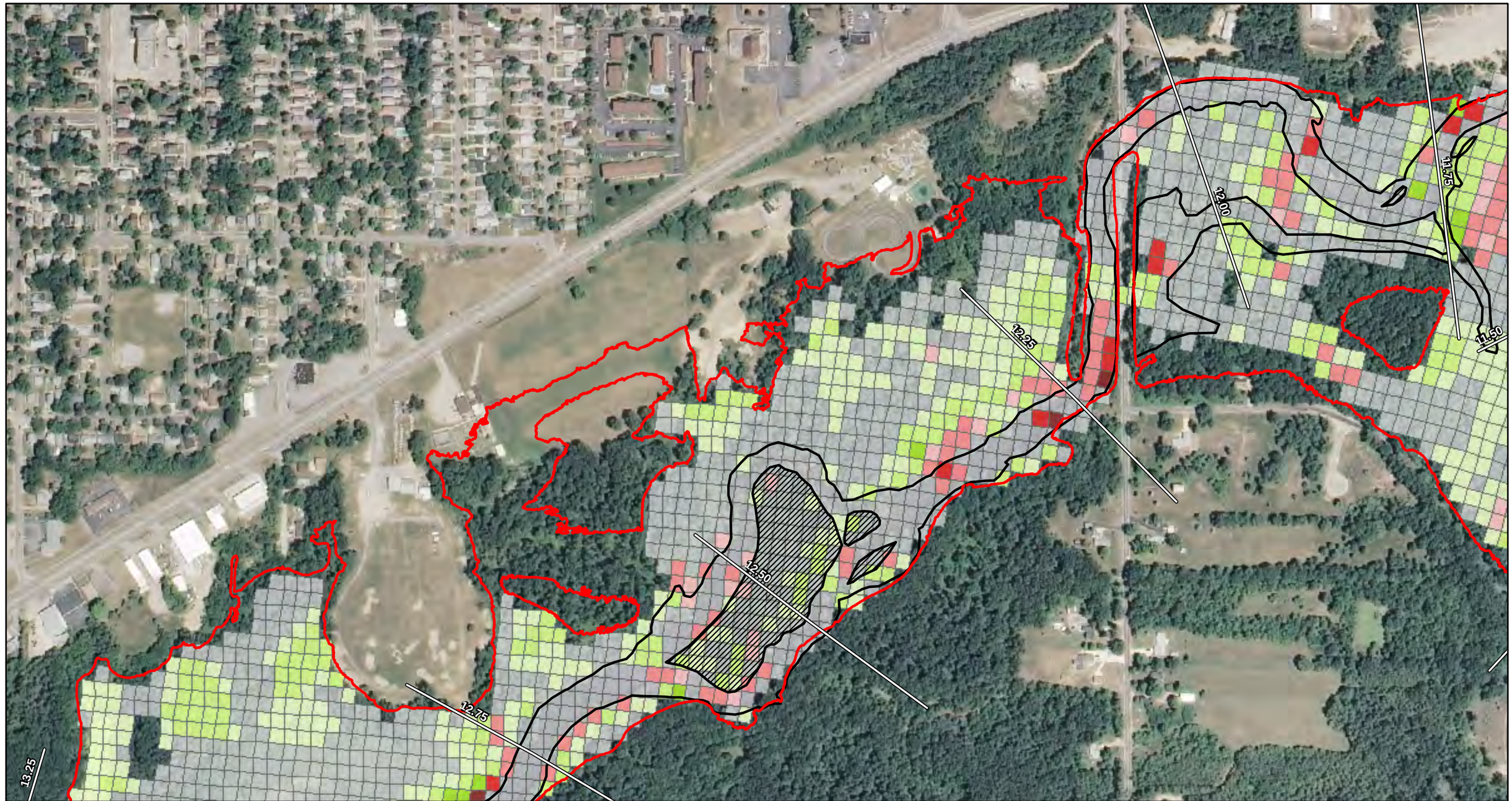
FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 10.80 - MP 11.70

SHEET 10 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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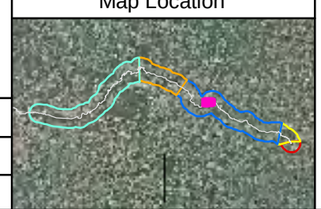
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

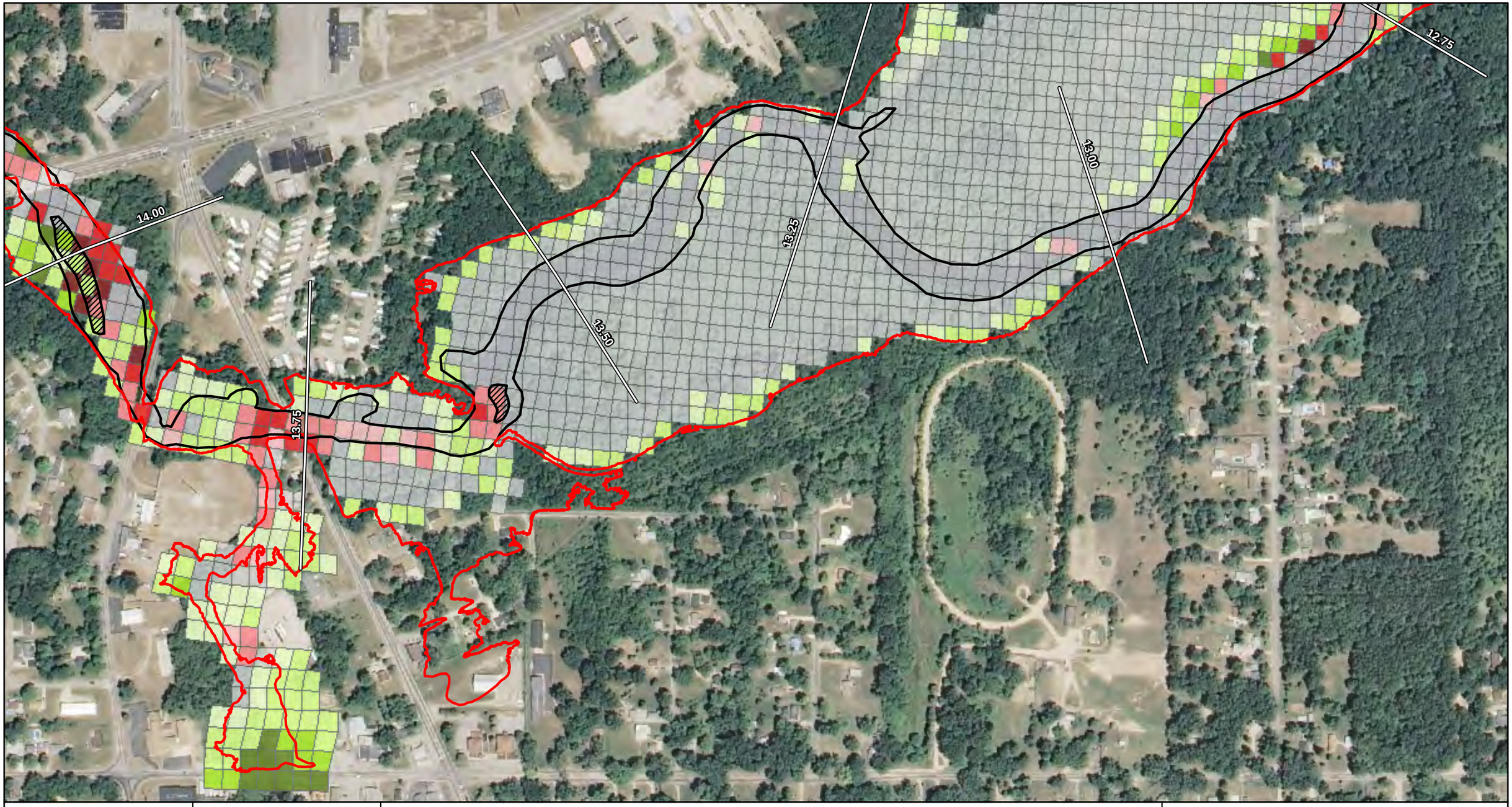
FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 11.70 - MP 12.77

SHEET 11 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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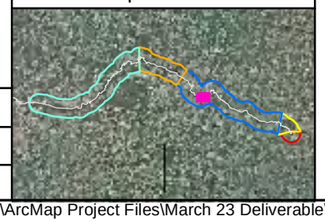
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

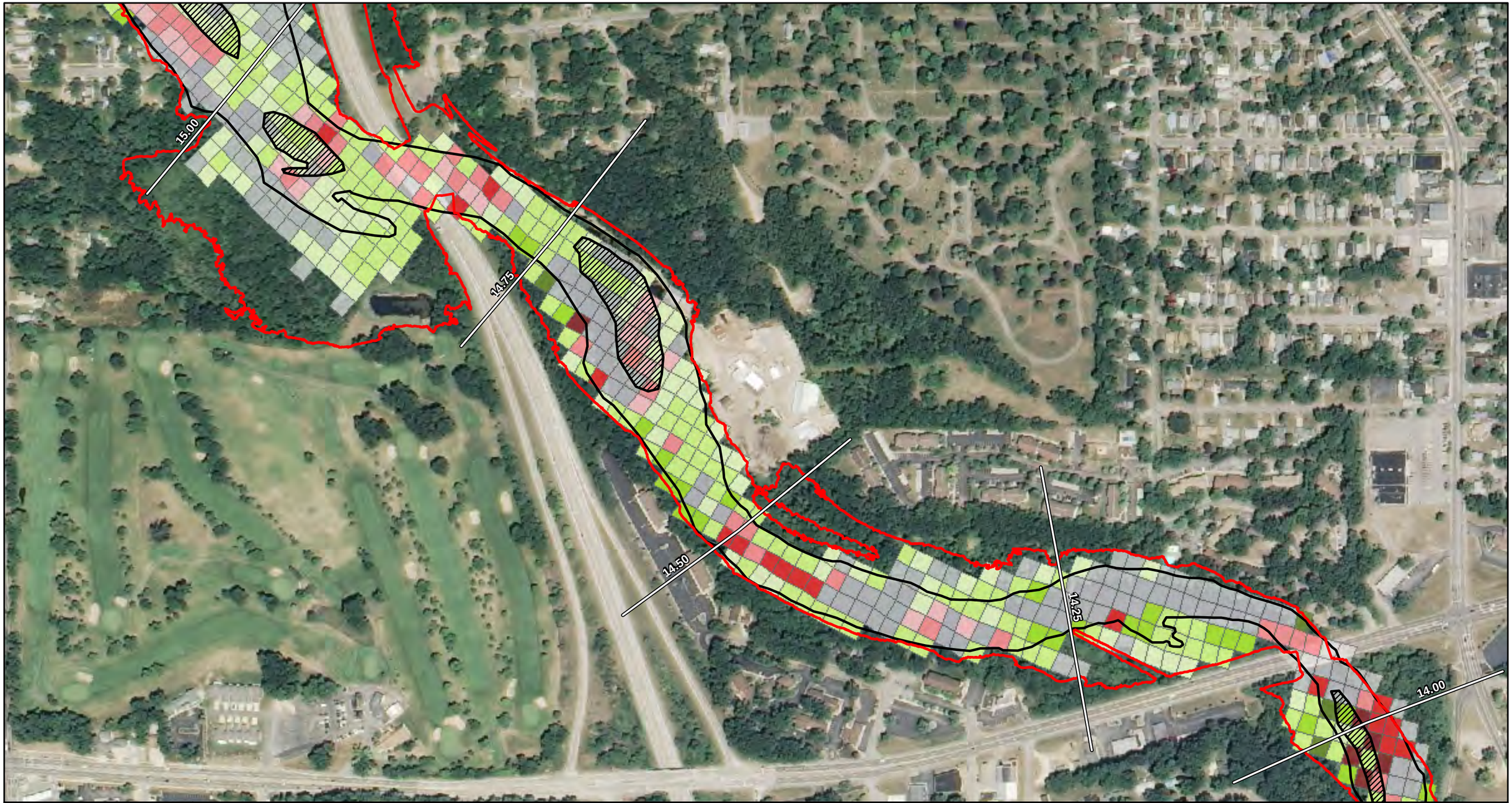
FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 12.77 - MP 14.00

SHEET 12 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 14.00 - MP 15.05

SHEET 13 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009

15.50

15.25

15.00

ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 15.05 - MP 15.71

SHEET 14 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 15.71 - MP 16.38

SHEET 15 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

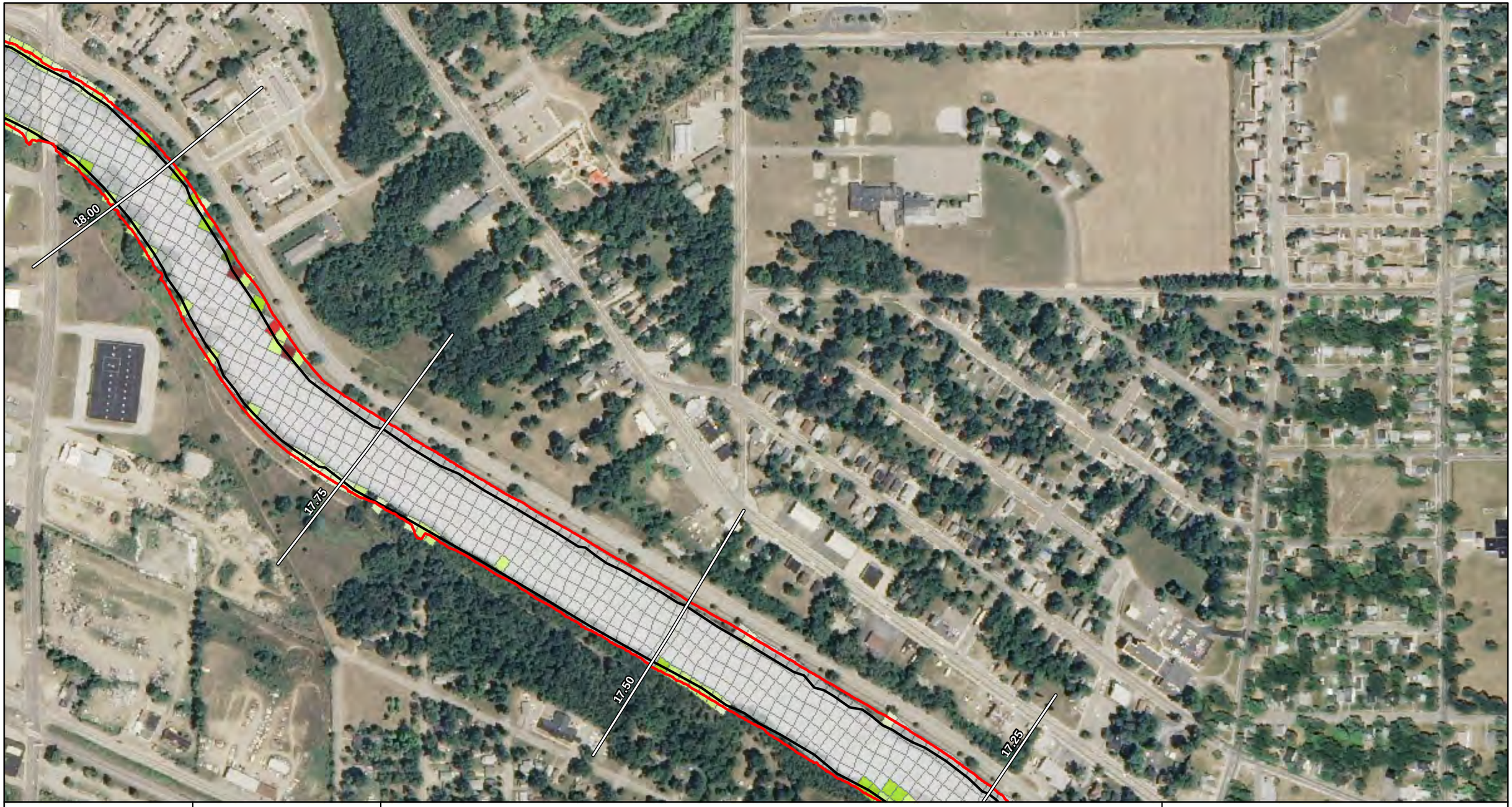
FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 16.38 - MP 17.30

SHEET 16 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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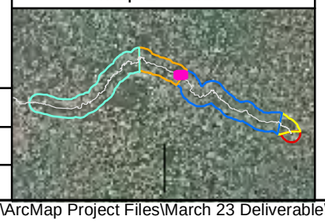
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

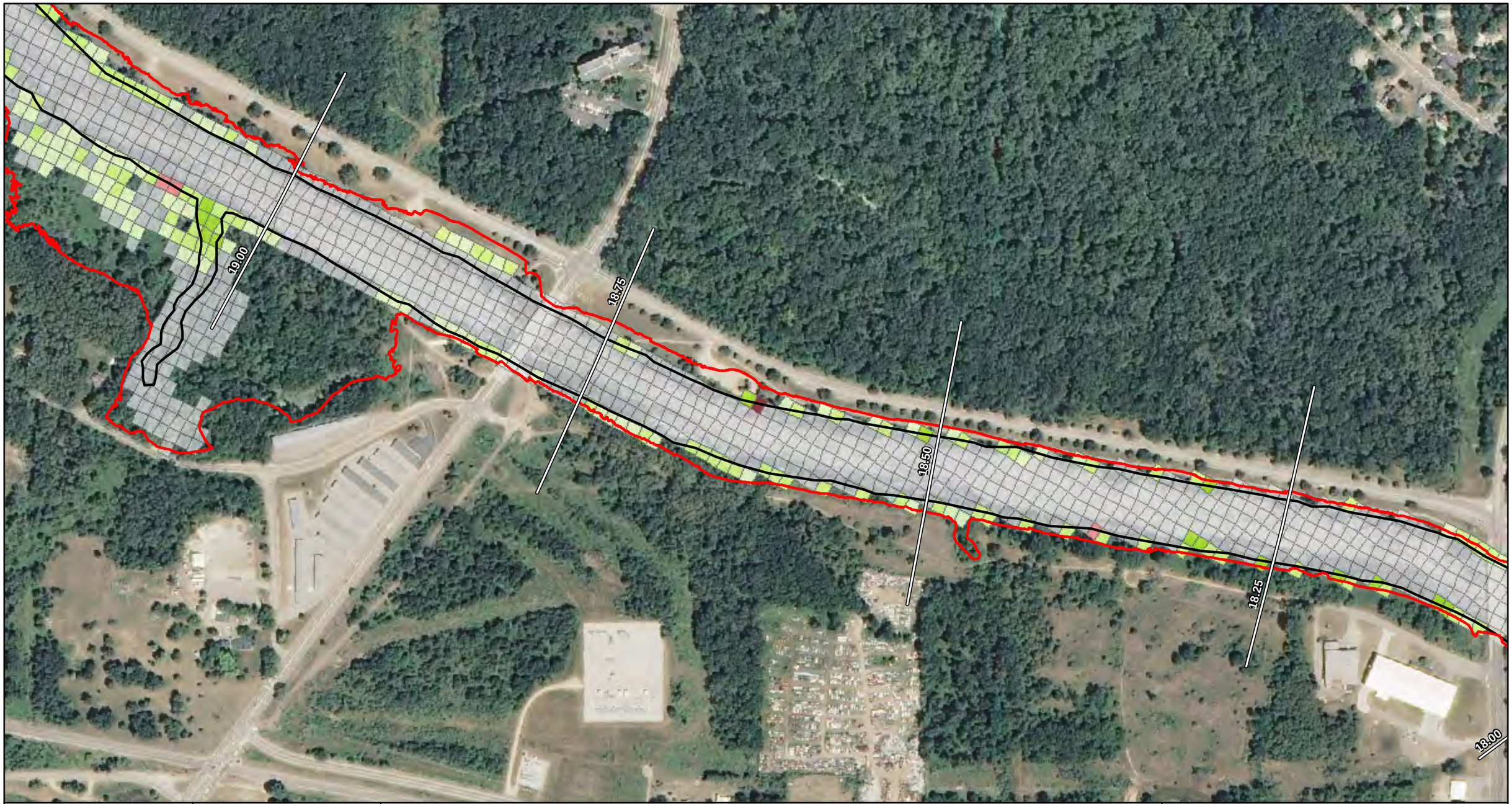
FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 17.30 - MP 18.11

SHEET 17 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Sedimentation_Rate2_May-June_2011.mxd

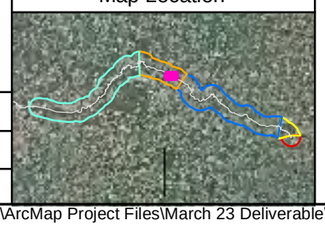
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

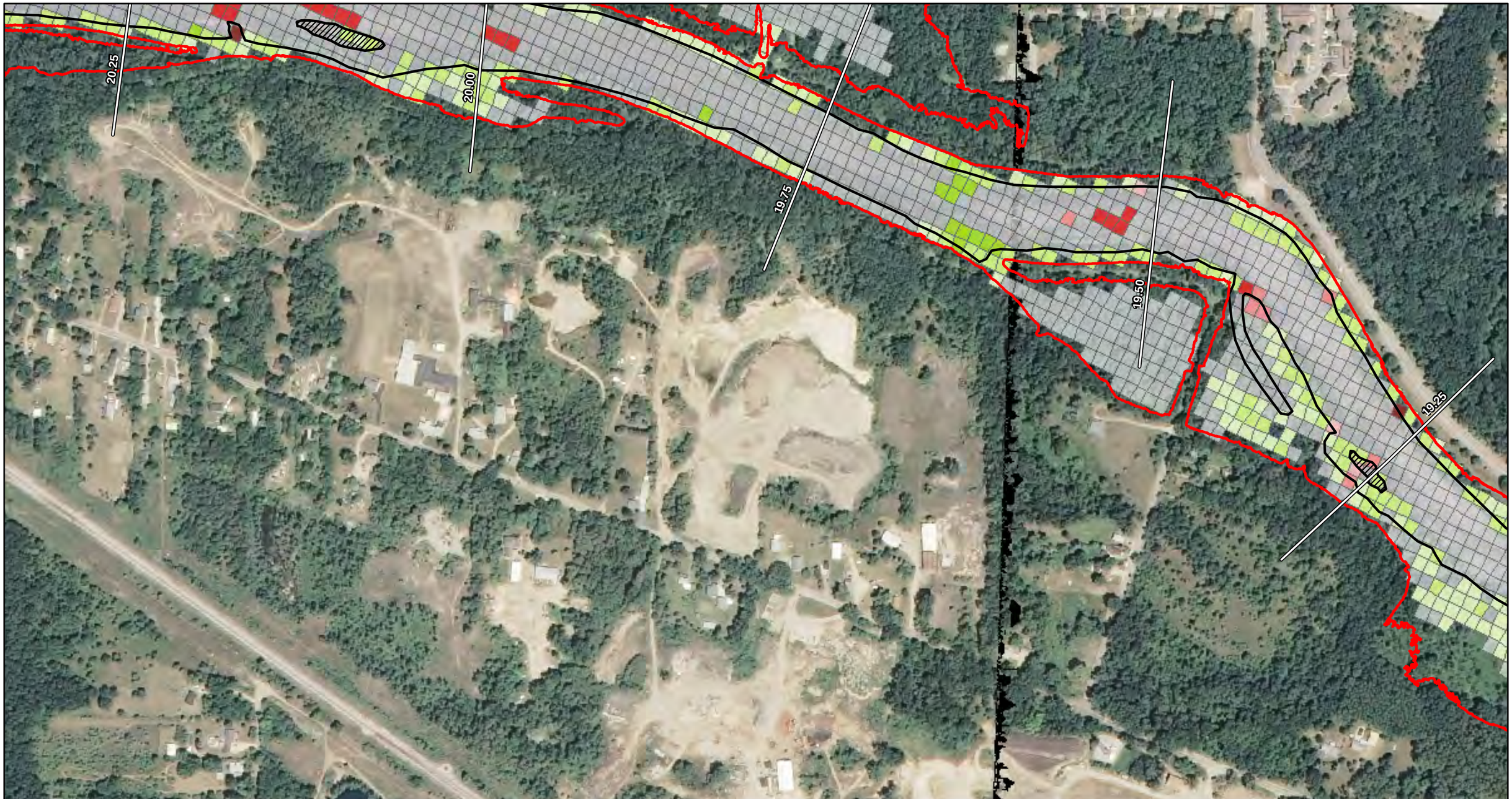
FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 18.11 - MP 19.18

SHEET 18 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 19.18 - MP 20.00

SHEET 19 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009

20.25

20.00

19.75

ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

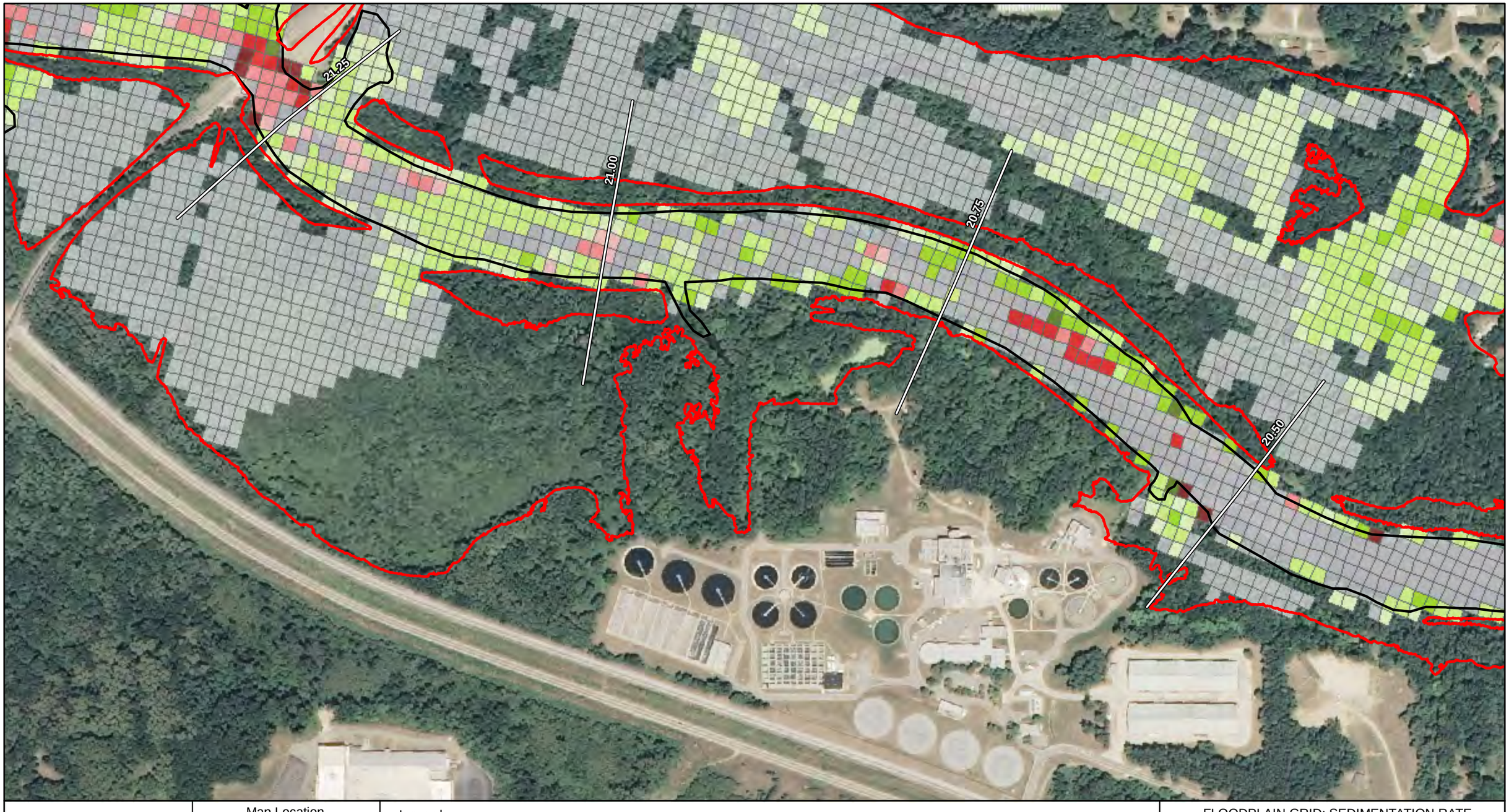
FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 20.00 - MP 20.32

SHEET 20 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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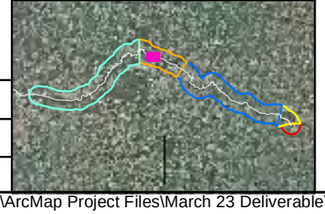
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 20.32 - MP 21.36

SHEET 21 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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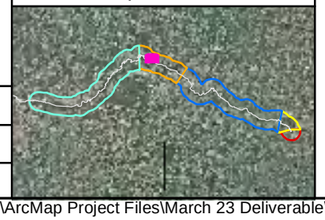
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

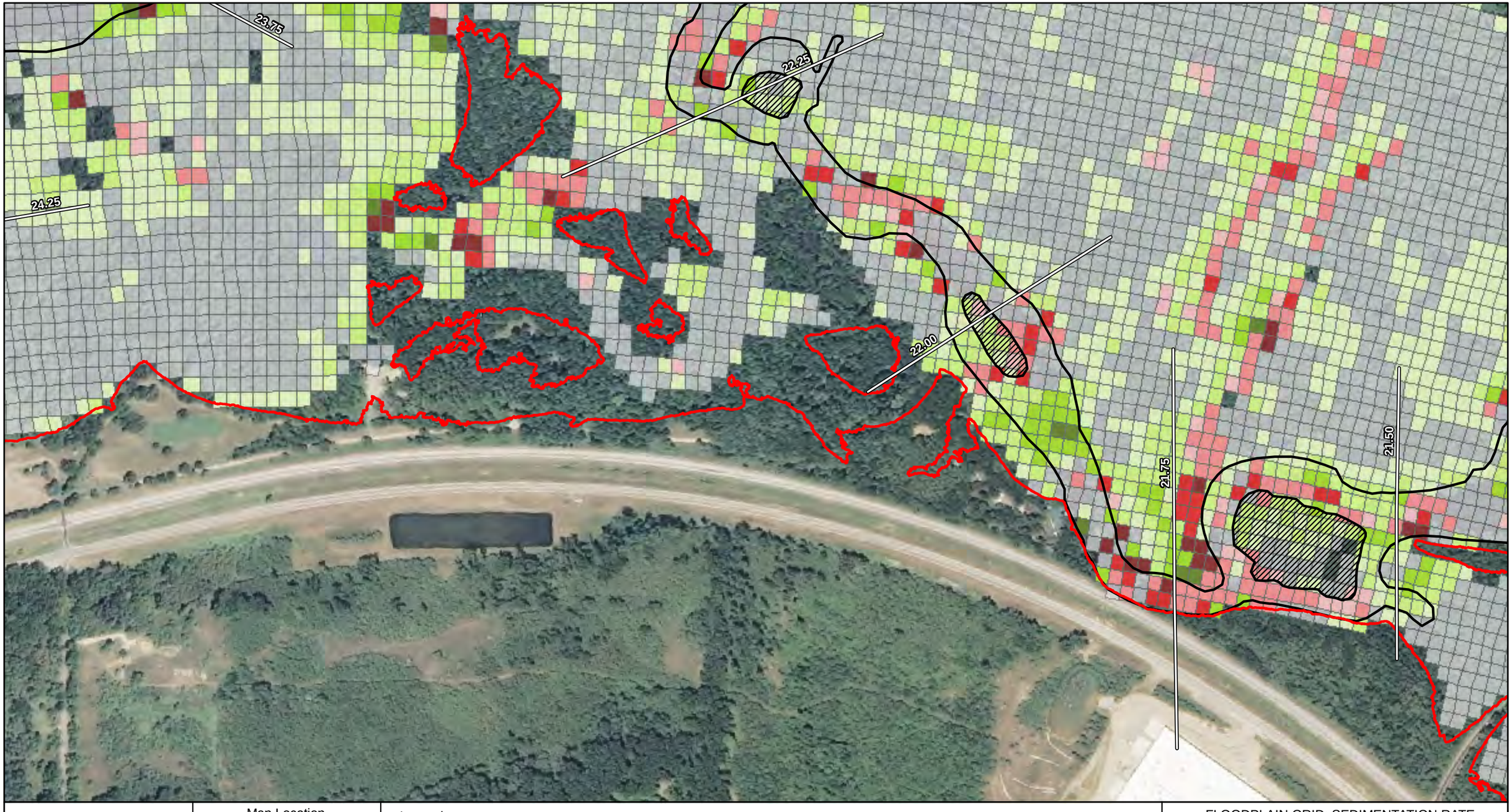
FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 21.36 - MP 21.59

SHEET 22 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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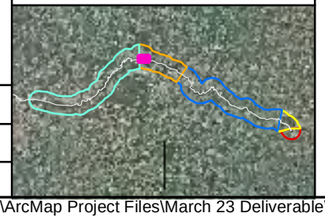
Aerial Photography Date: July & August 2009



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Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

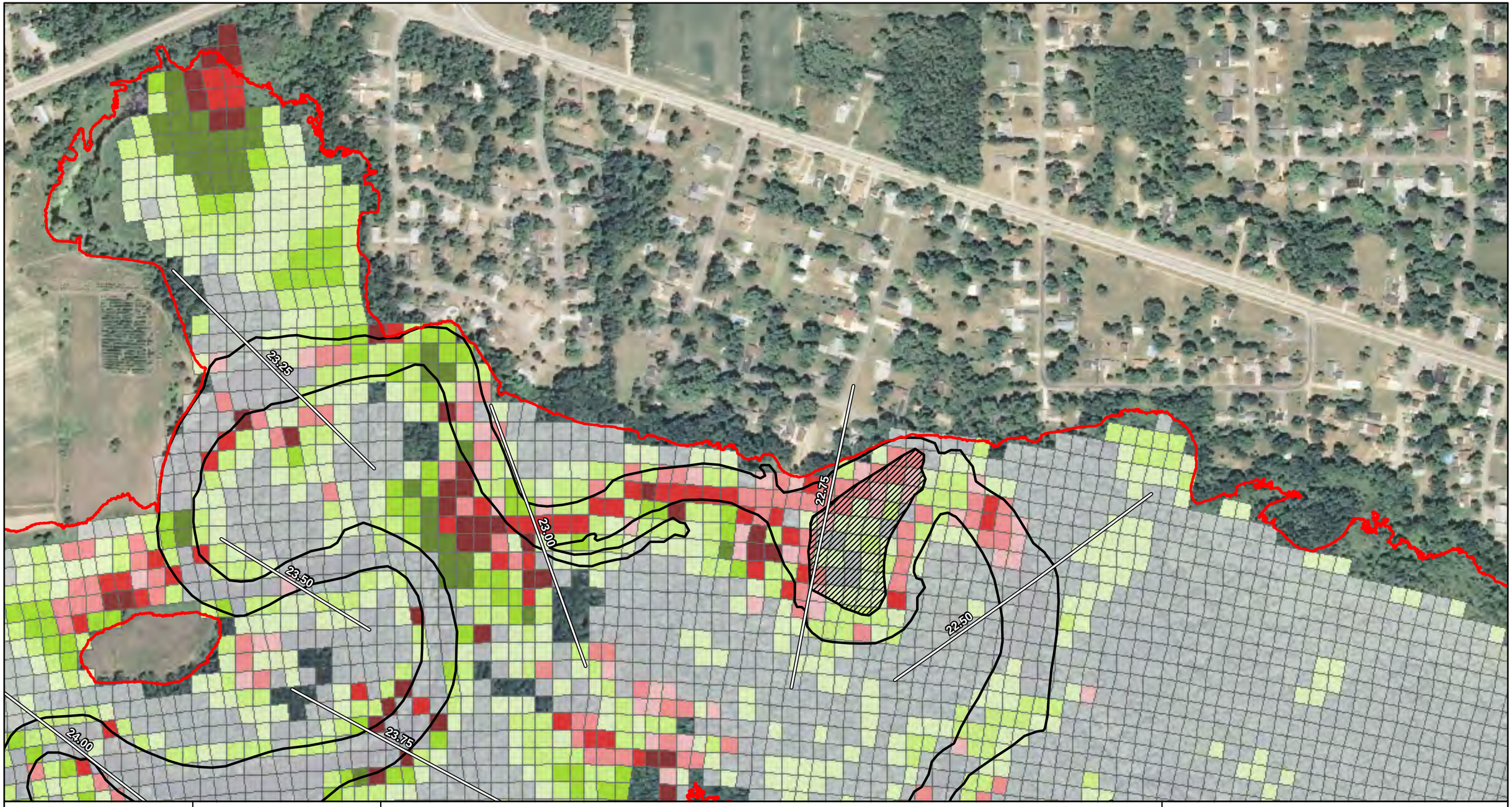
FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 21.59 - MP 22.33

SHEET 23 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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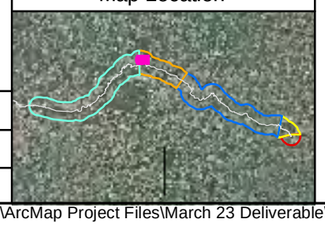
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

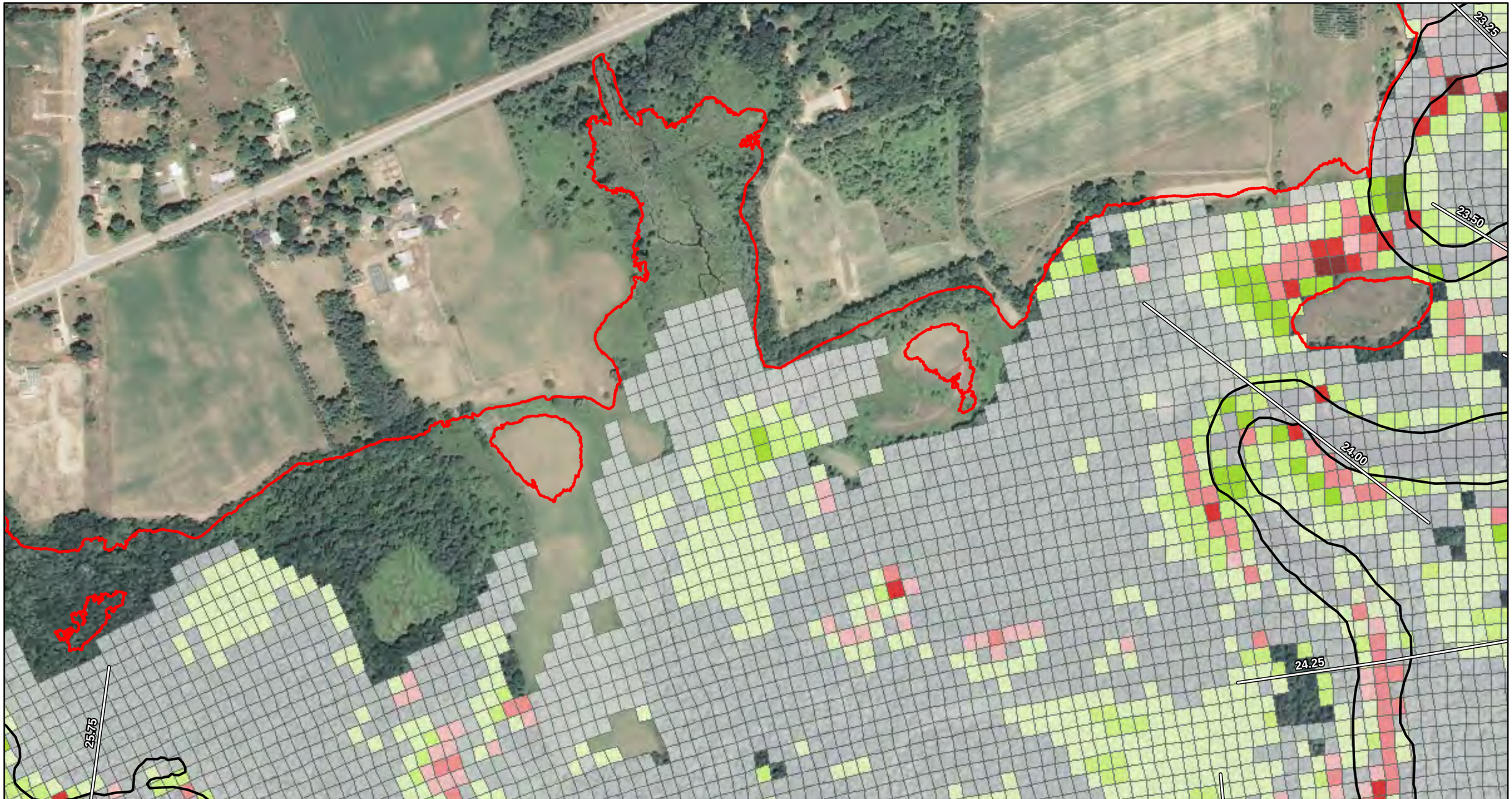
FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 22.33 - MP 24.01

SHEET 24 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS	3/30/2012
Approved:	DBR	3/30/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

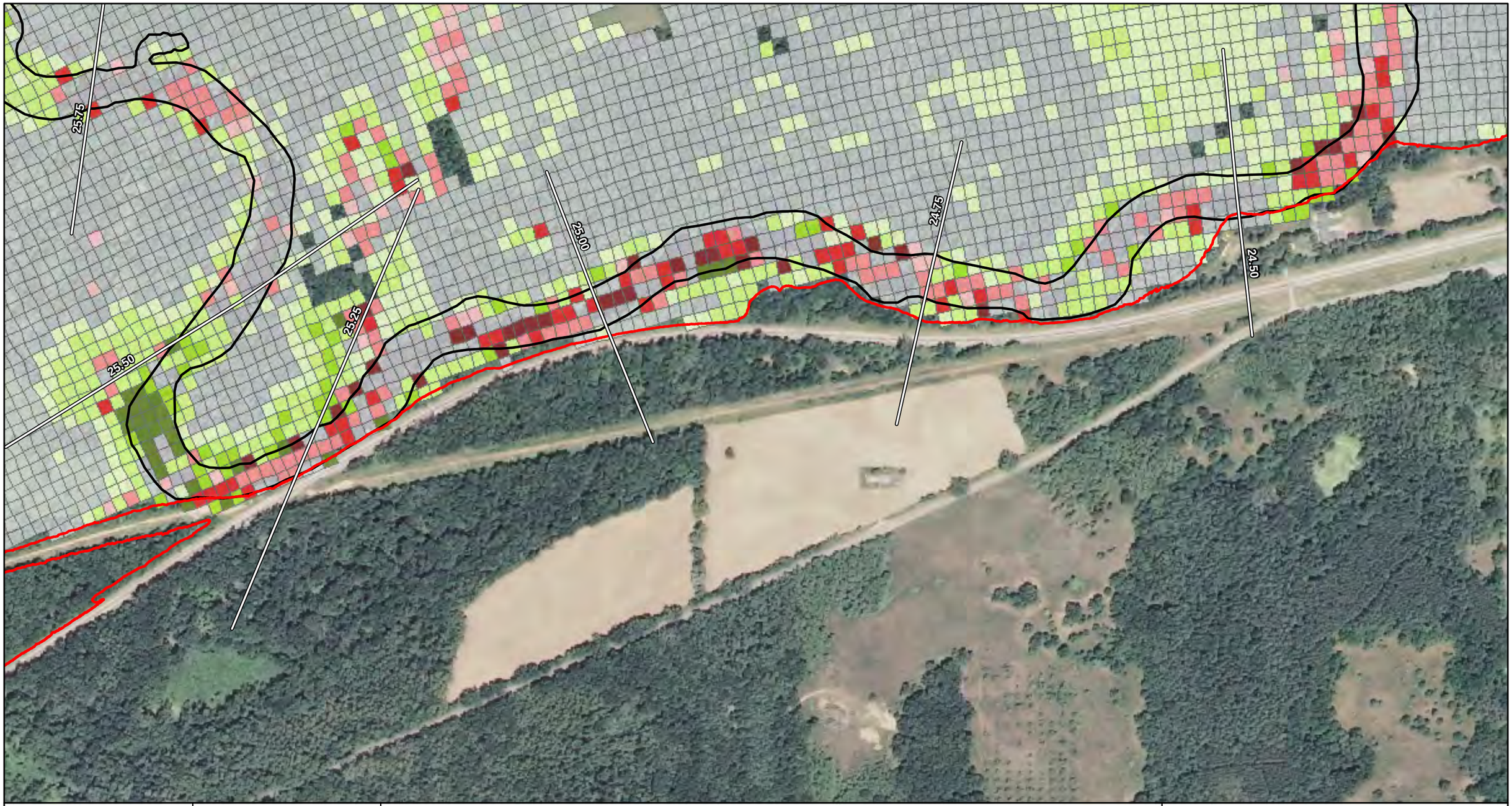
FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 24.01 - MP 24.33

SHEET 25 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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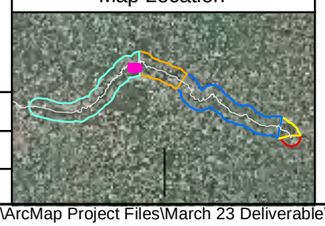
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

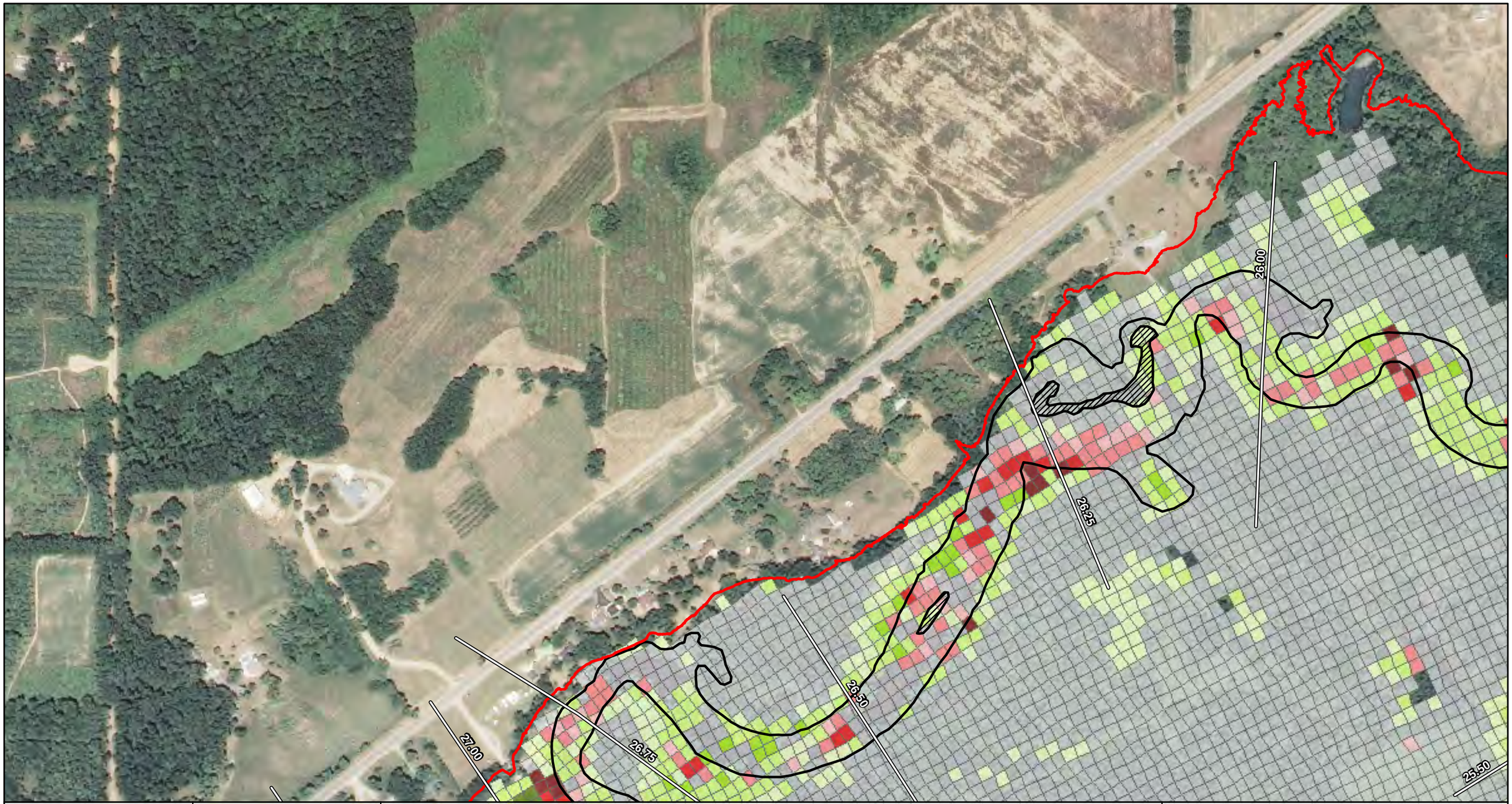
FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 24.33 - MP 25.79

SHEET 26 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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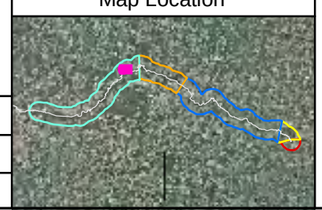
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

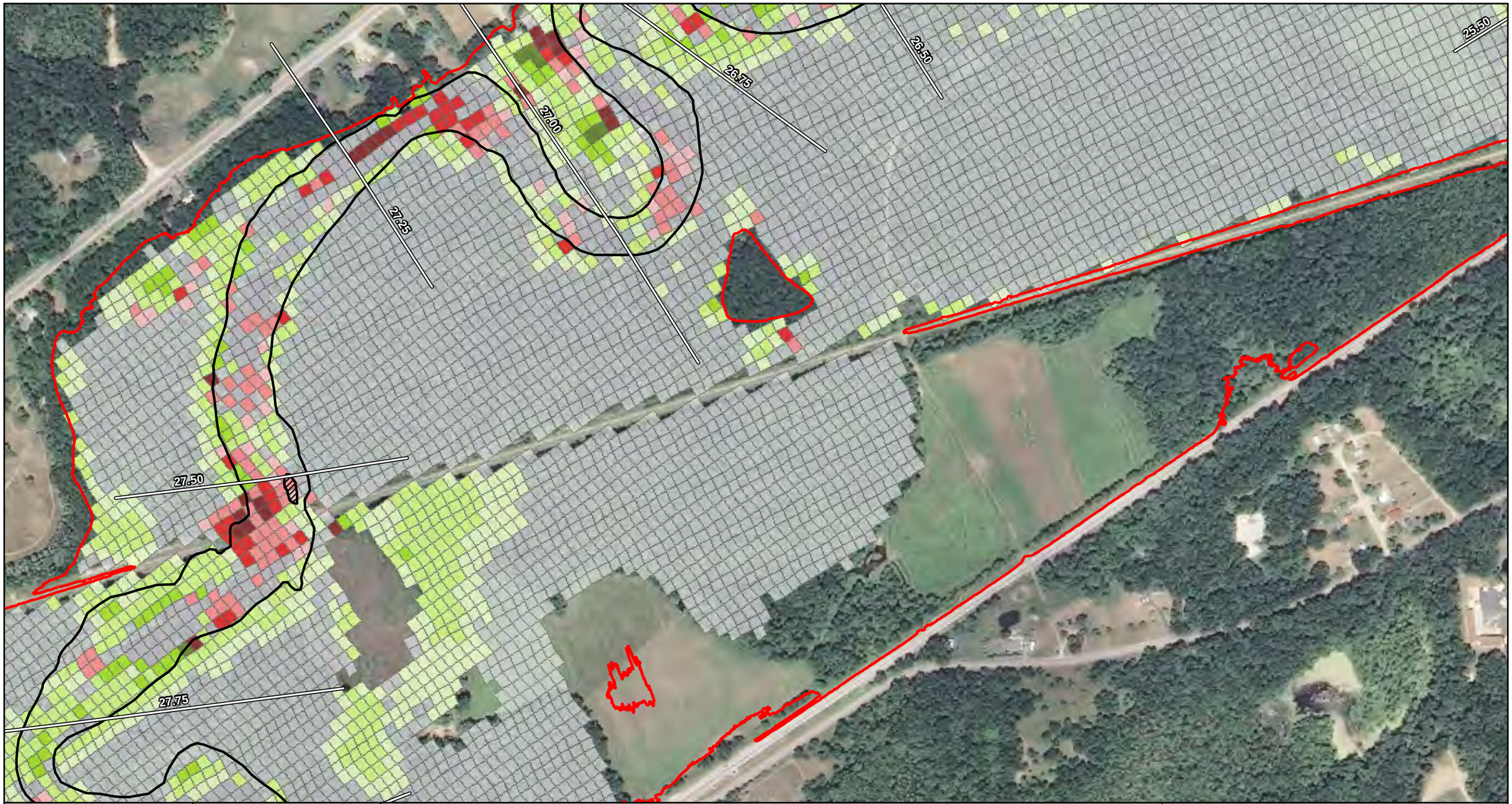
FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 25.79 - MP 26.80

SHEET 27 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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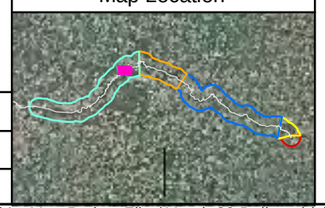
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 26.80 - MP 27.80

SHEET 28 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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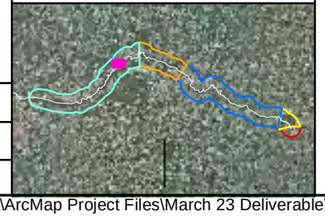
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 27.80NW - MP 28.22NW

SHEET 29 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 27.80SE - MP 28.22SE

SHEET 30 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

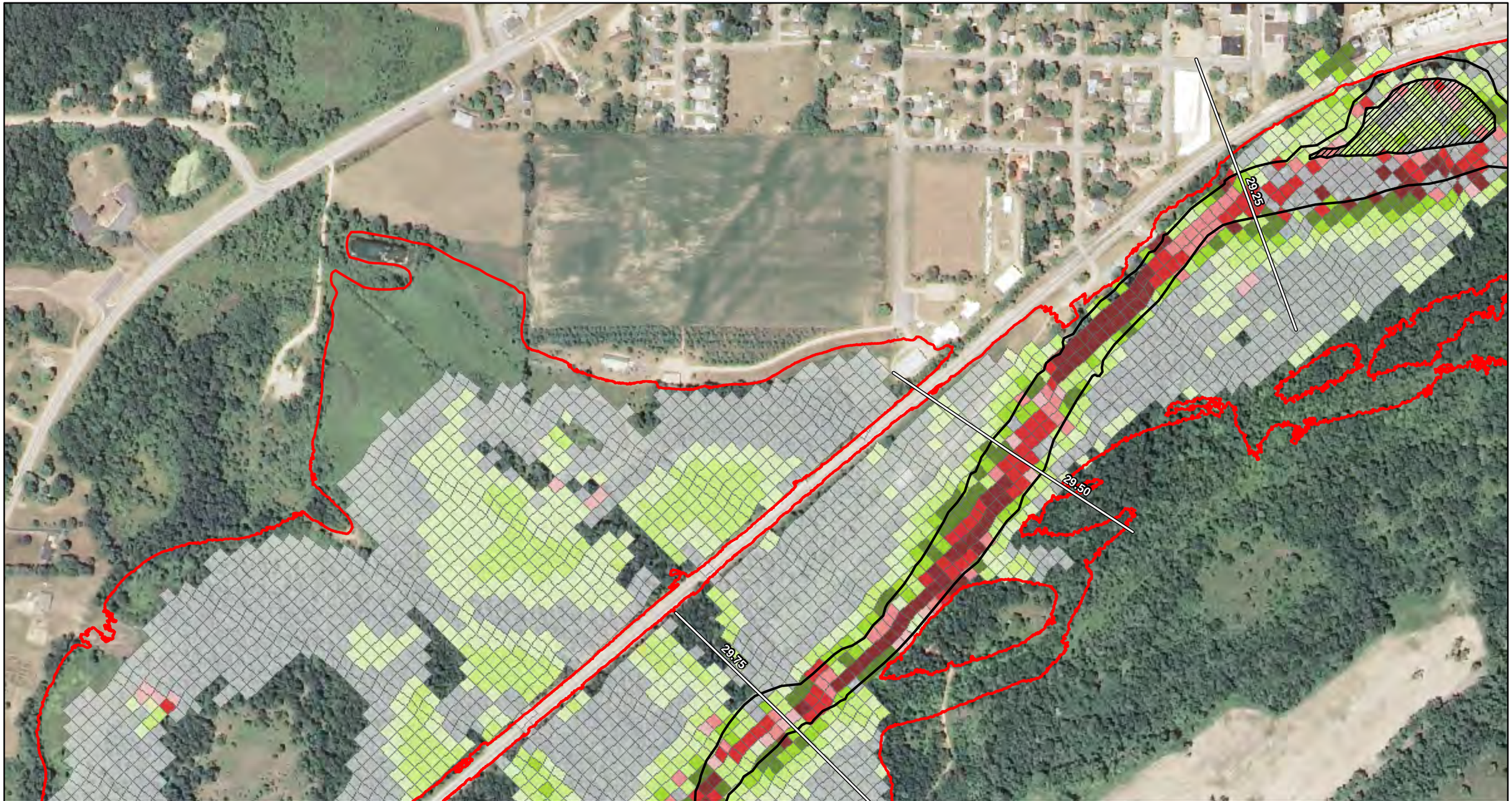
FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 28.22 - MP 29.20

SHEET 31 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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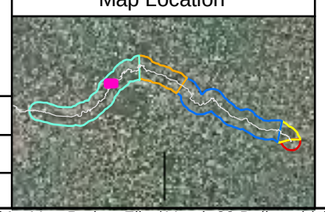
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

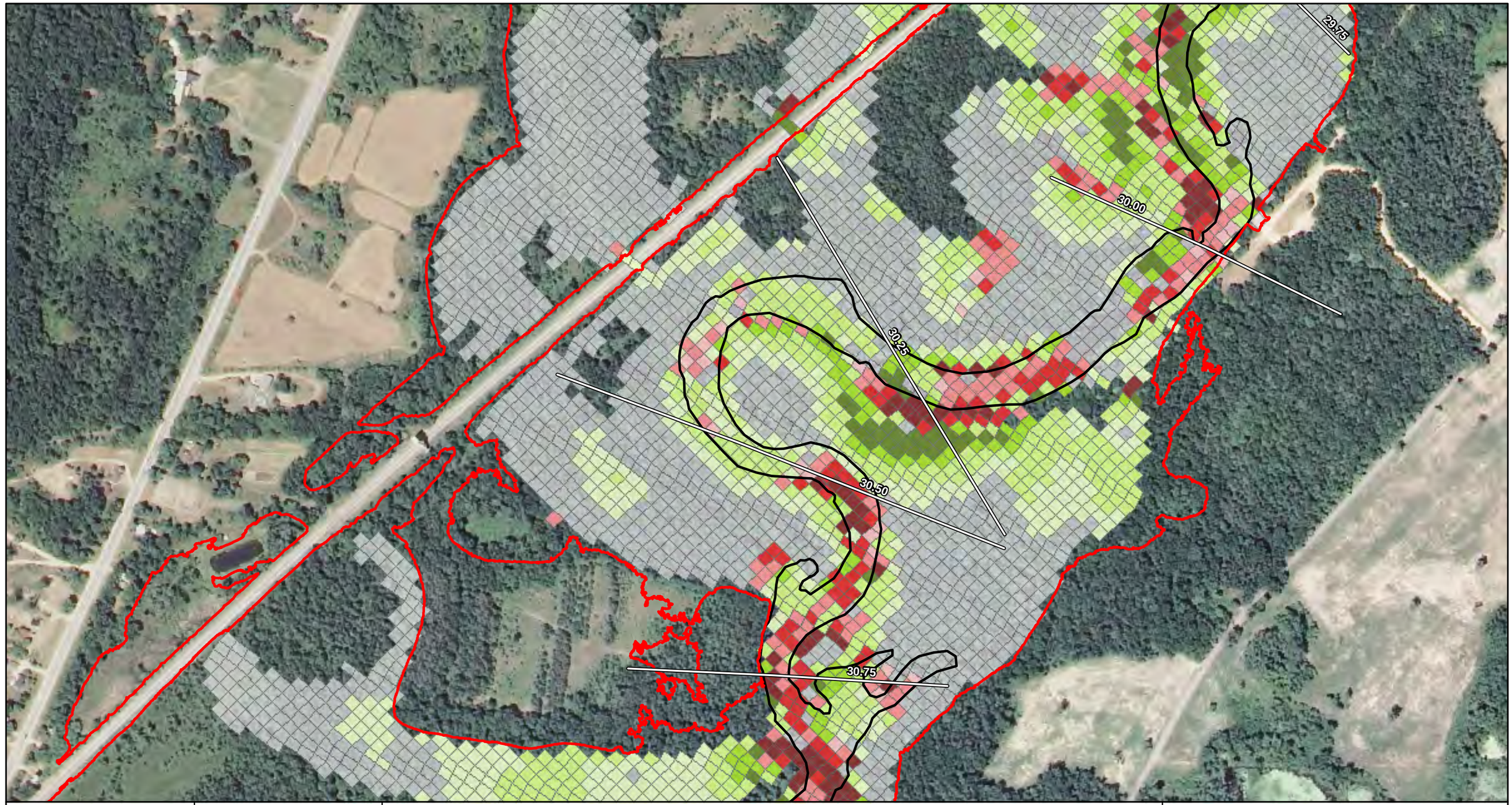
FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 29.20 - MP 29.82

SHEET 32 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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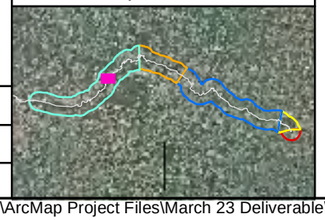
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

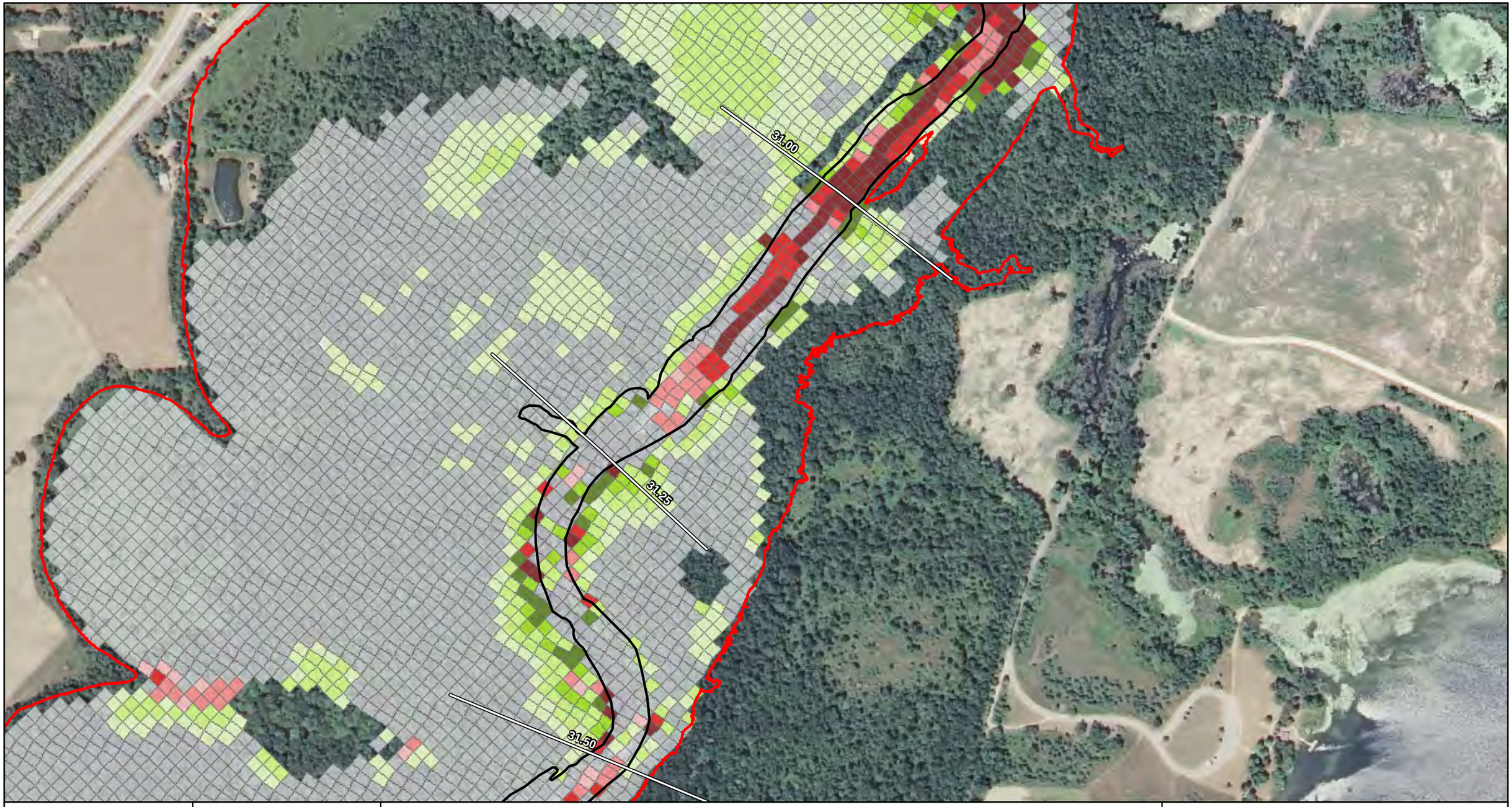
FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 29.82 - MP 30.84

SHEET 33 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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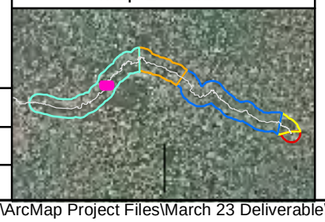
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

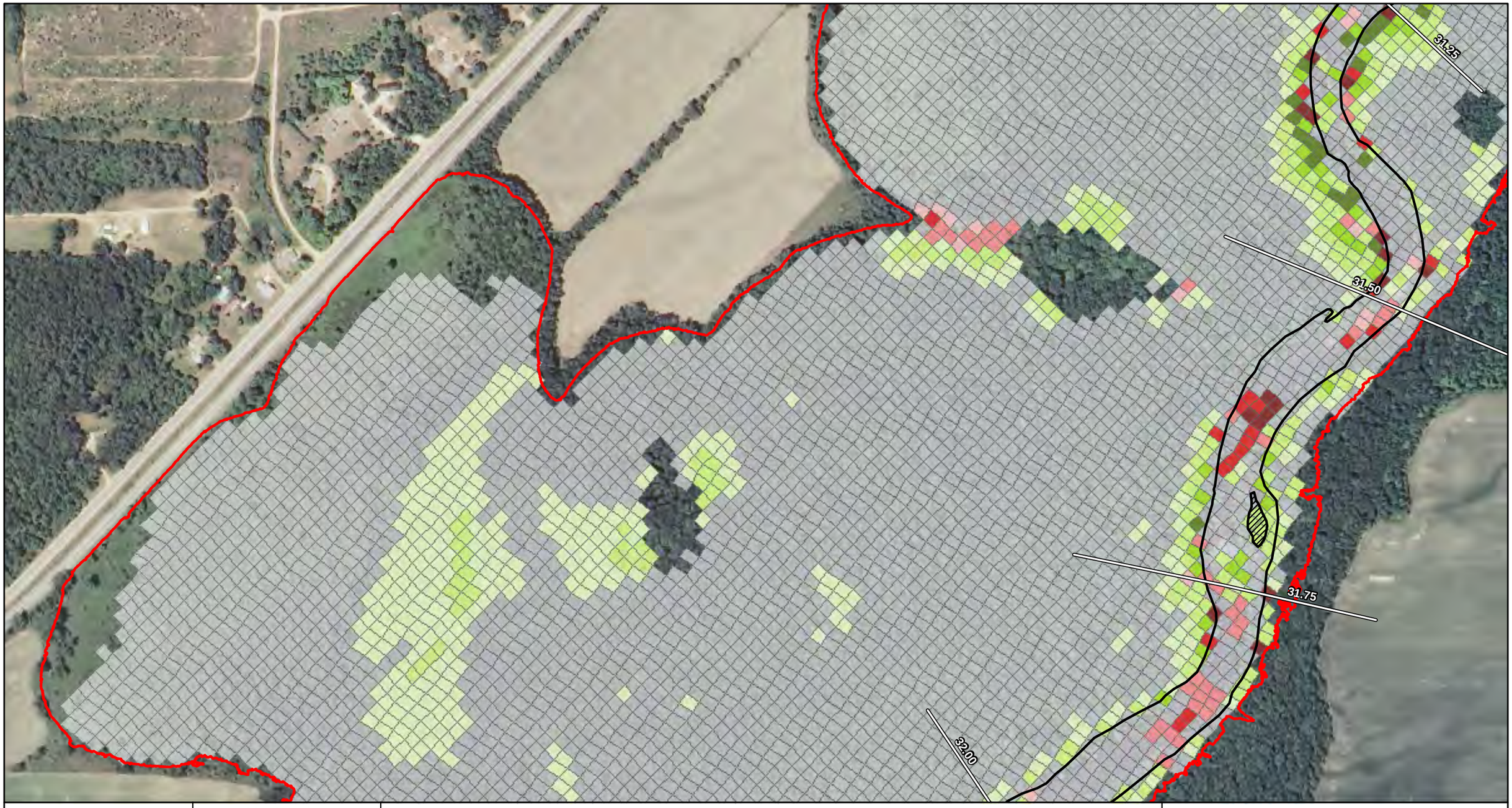
FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 30.84 - MP 31.40

SHEET 34 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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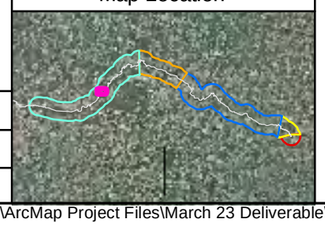
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

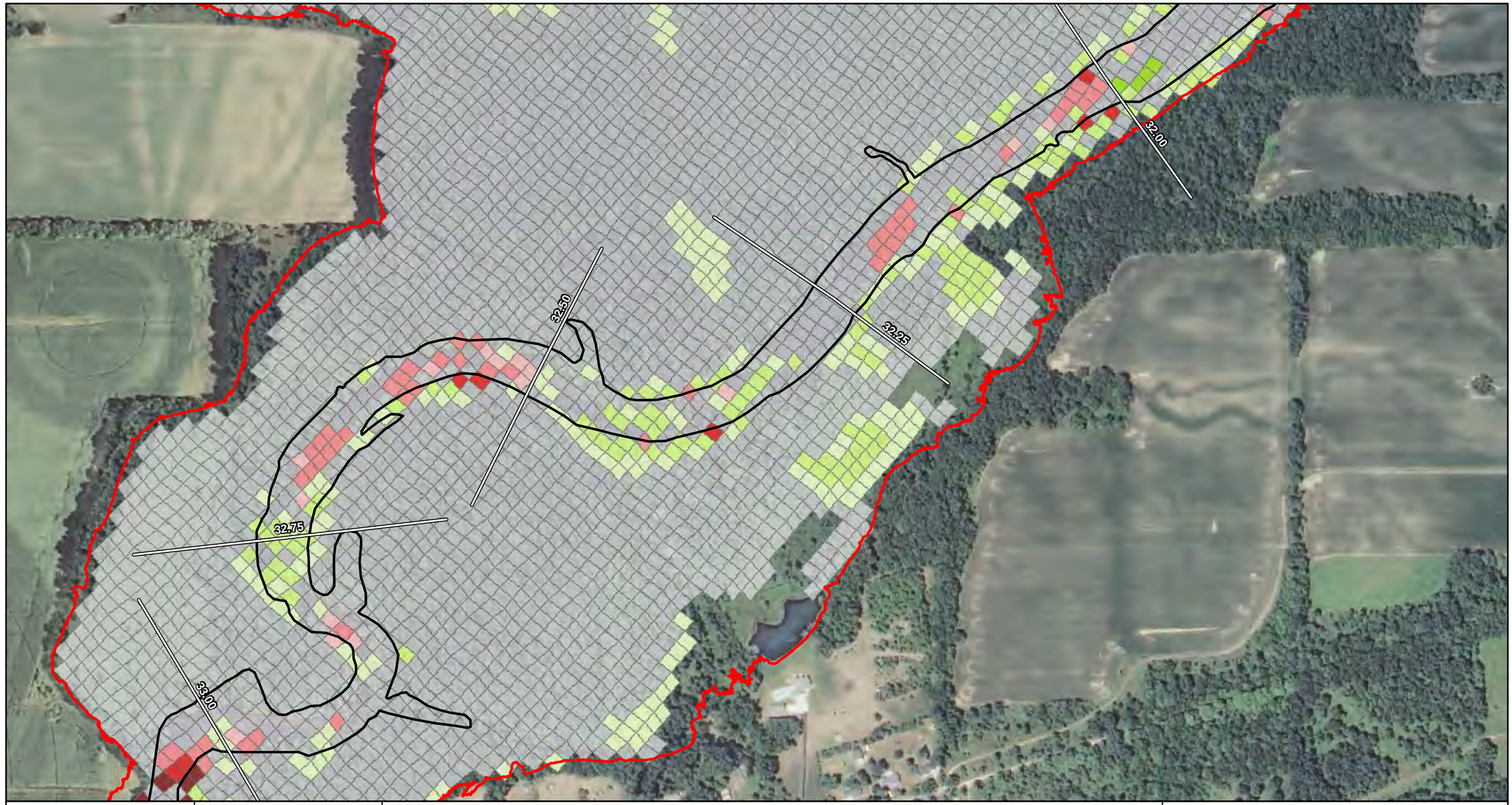
FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 31.40 - MP 31.94

SHEET 35 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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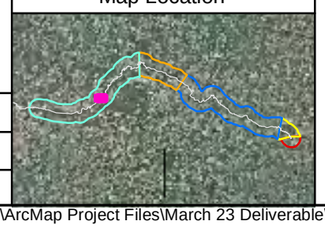
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 31.94 - MP 33.00

SHEET 36 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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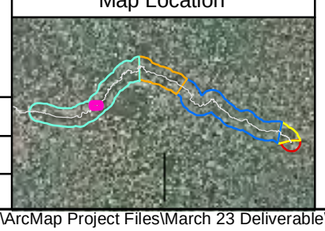
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

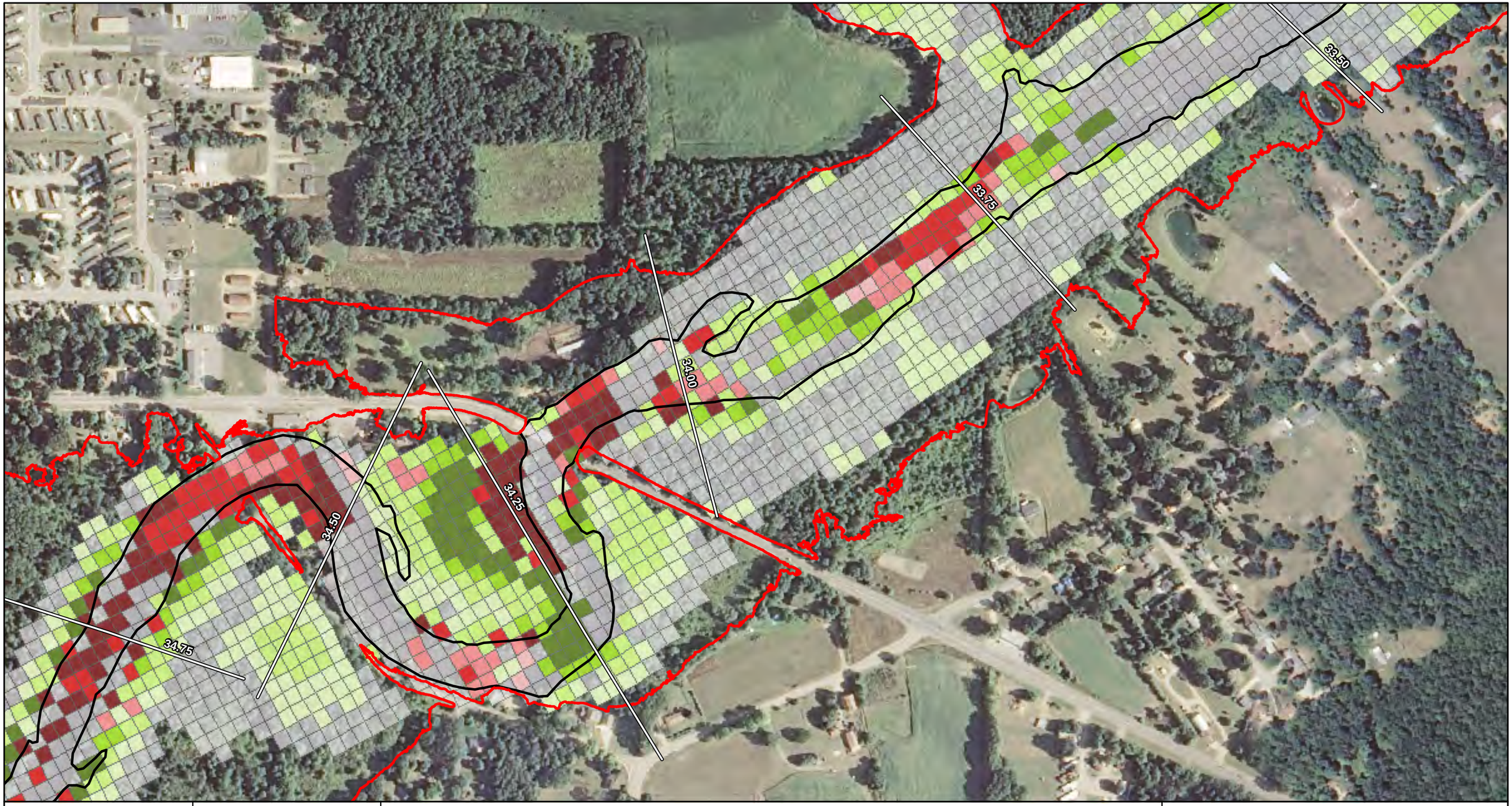
FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 33.00 - MP 33.52

SHEET 37 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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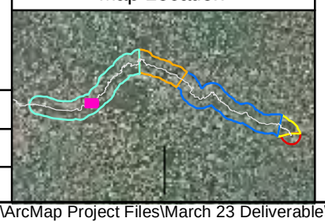
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

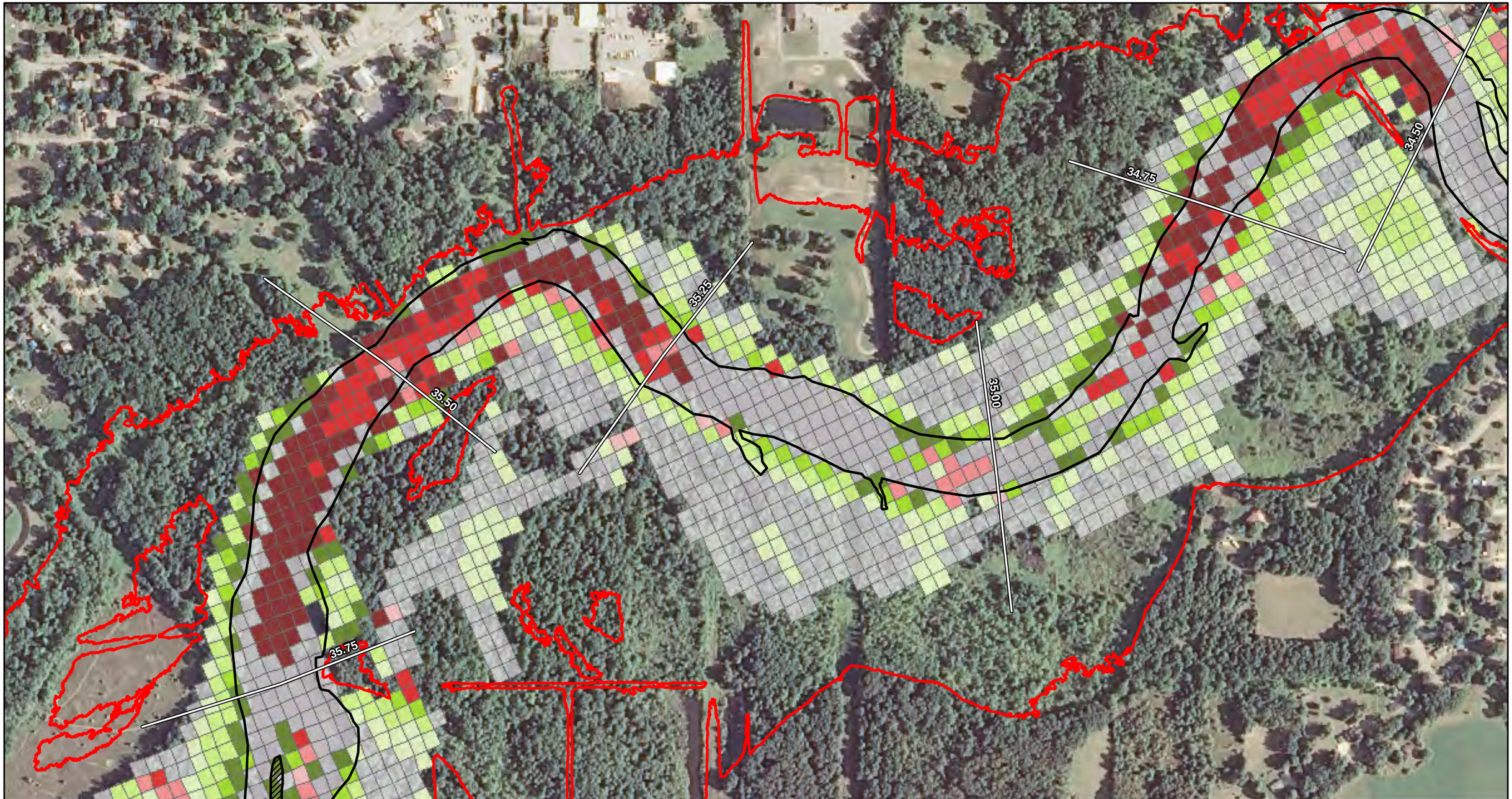
FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 33.52 - MP 34.70

SHEET 38 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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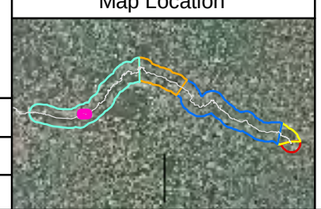
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

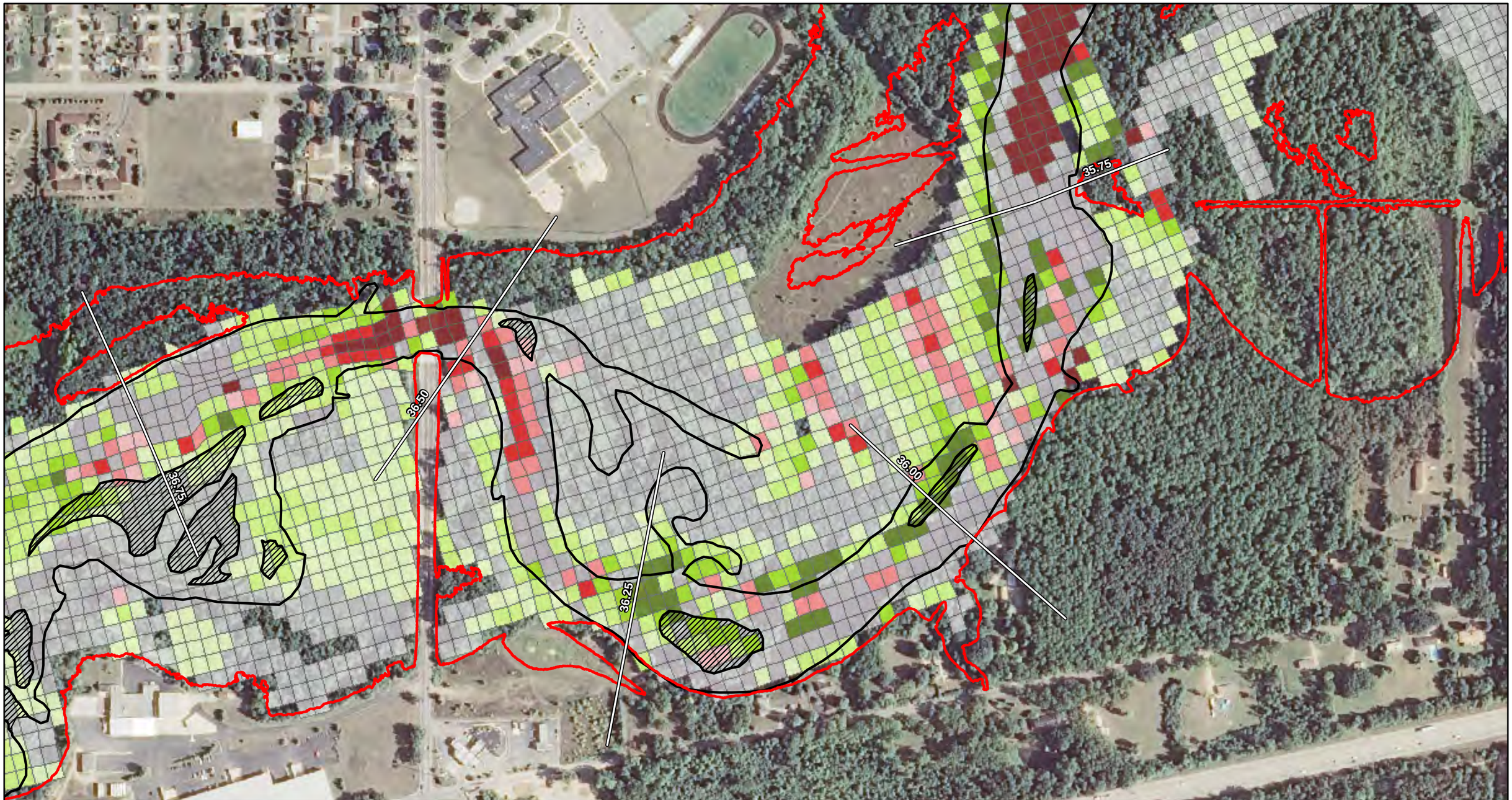
FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 34.70 - MP 35.75

SHEET 39 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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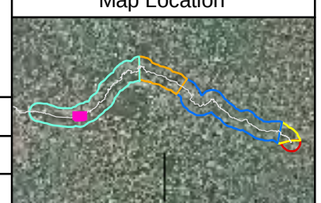
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 35.75 - MP 36.75

SHEET 40 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009

37.75

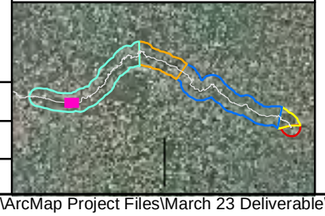
37.50

37.25

37.00

36.75

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 36.75 - MP 37.75

SHEET 41 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009

38.75
38.50
38.25
38.00

ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 37.75N - MP 38.80N

SHEET 42 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009

38.75
38.50
38.25
38.00
37.75

ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 37.75S - MP 38.80S

SHEET 43 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009

39.75

39.50

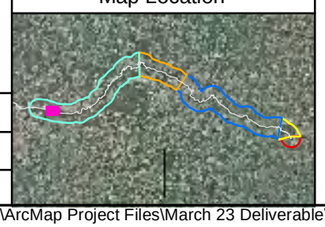
39.25

39.00

ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 38.80N - MP 39.95N

SHEET 44 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009

39.50

39.25

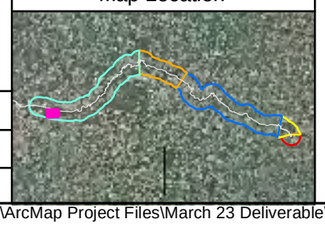
39.00

38.75

ENBRIDGE

Drawn:	BRS 3/30/2012
Approved:	DBR 3/30/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
MAY 27 - JUNE 3, 2011
MP 38.80S - MP 39.95S

SHEET 45 OF 45

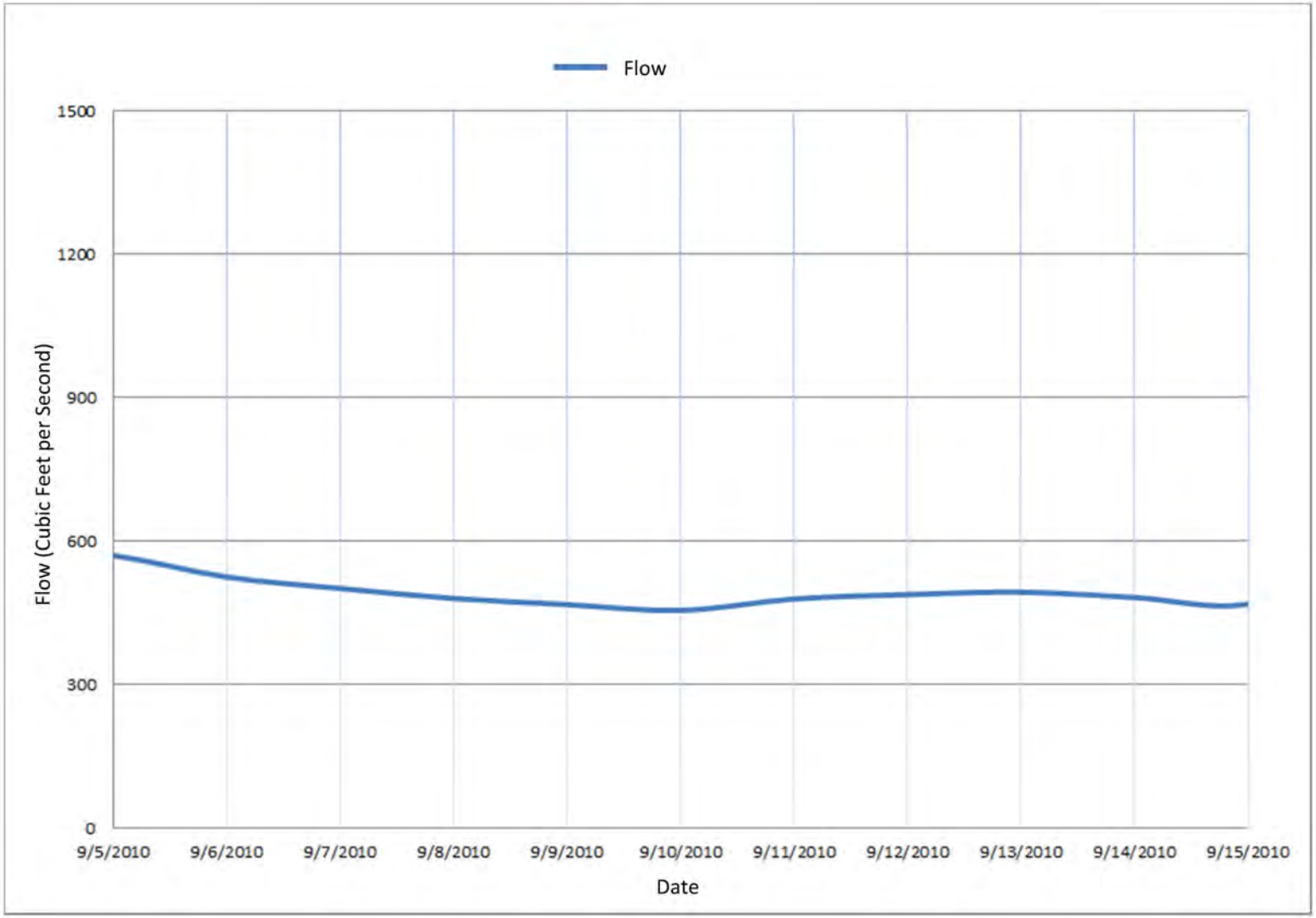
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Sedimentation_Rate2_May-June_2011.mxd

Aerial Photography Date: July & August 2009

Figure 6-1

Flow at Kalamazoo River Gage Near Battle Creek for September 2010 Low Flow Event



ENBRIDGE

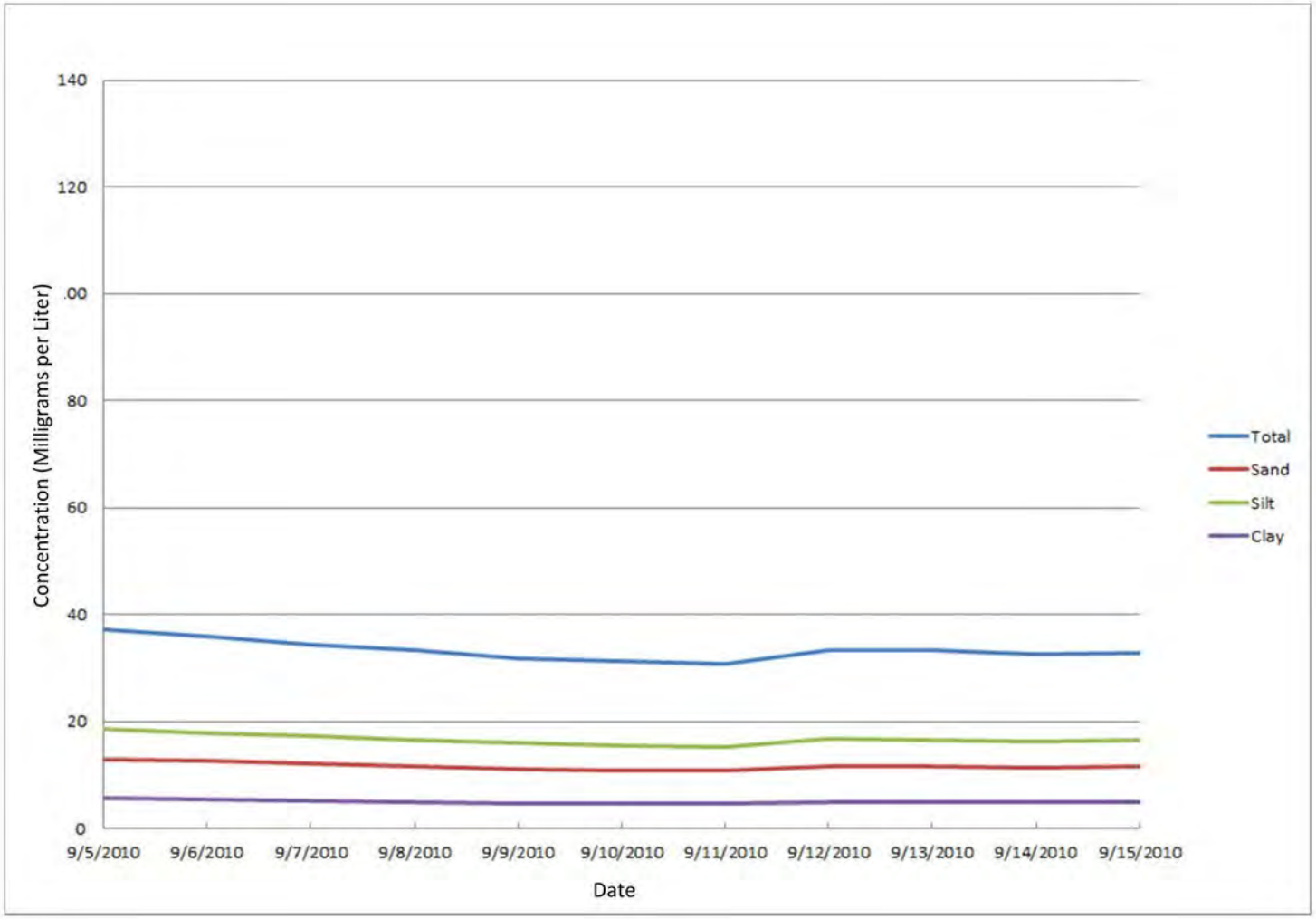
Drawn:	JLH	04/17/2012
Approved:	DBR	04/17/2012
Project #:	106-4186	

FLOW AT KALAMAZOO RIVER GAGE NEAR BATTLE CREEK FOR SEPTEMBER 2010 LOW FLOW EVENT

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Figure 6-2

Boundary Sediment Concentration for September 2010 Low Flow Event



Drawn:	JLH 04/17/2012
Approved:	DBR 04/17/2012
Project #:	106-4186

BOUNDARY SEDIMENT CONCENTRATION FOR SEPTEMBER 2010 LOW FLOW EVENT

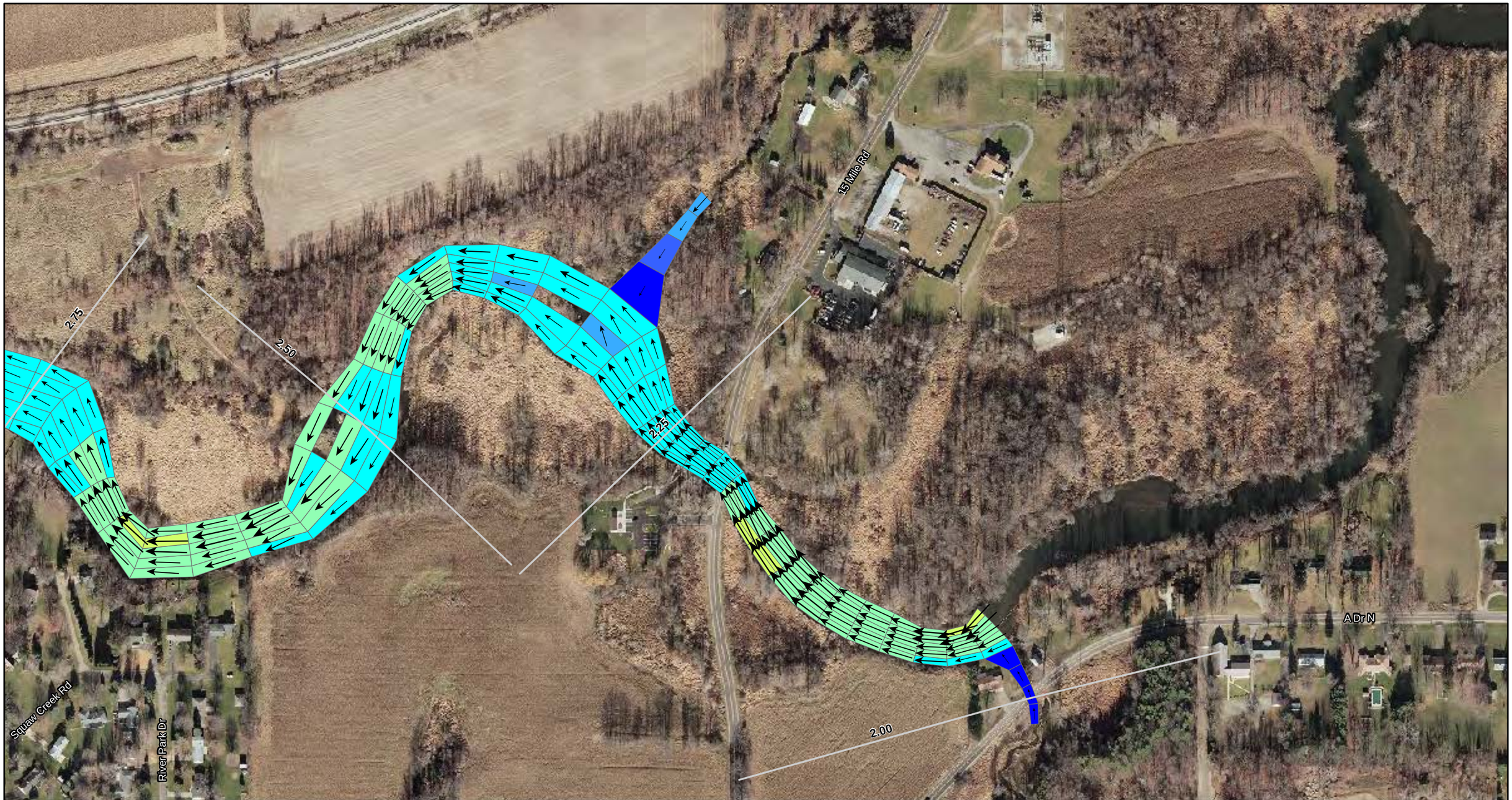
ENBRIDGE LINE 6B MP 608
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Figure 6-3

Riverine Grid: Velocity

September 8, 2010

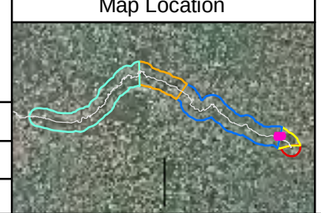
Sheets 1 through 56



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Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

MP 01.95 - MP 02.75

SHEET 1 OF 56

ENBRIDGE LINE 6B MP 608
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X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep8_2010.mxd

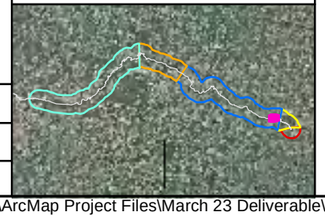
Aerial Photography Date: November 2011



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Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

MP 02.60 - MP 03.40

SHEET 2 OF 56

ENBRIDGE LINE 6B MP 608
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Aerial Photography Date: November 2011

4.00

3.75

3.50

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

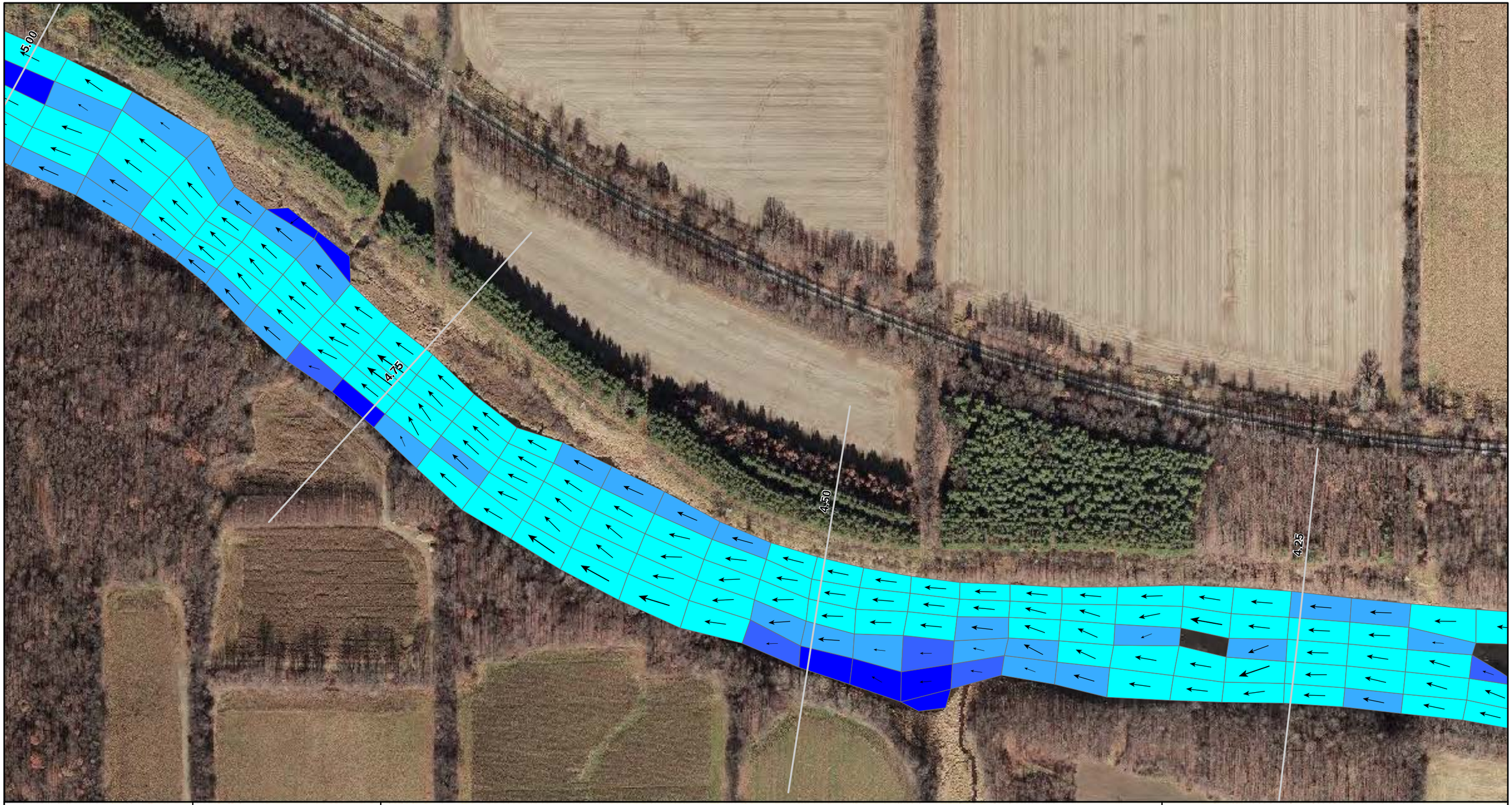
MP 03.40 - MP 04.20

SHEET 3 OF 56

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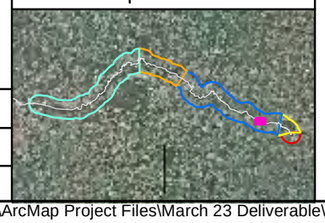
Aerial Photography Date: November 2011



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Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

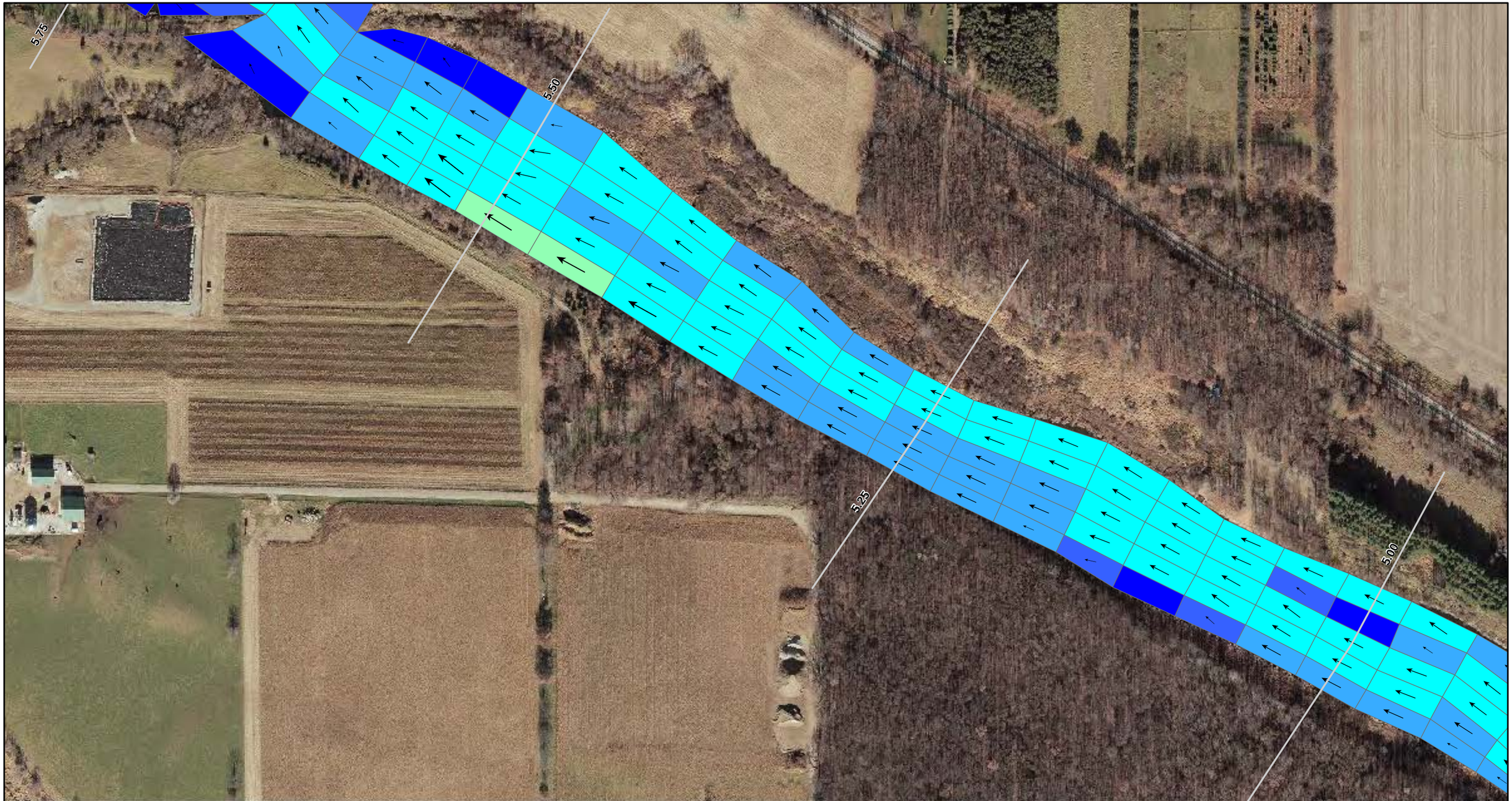
MP 04.15 - MP 05.00

SHEET 4 OF 56

ENBRIDGE LINE 6B MP 608
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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

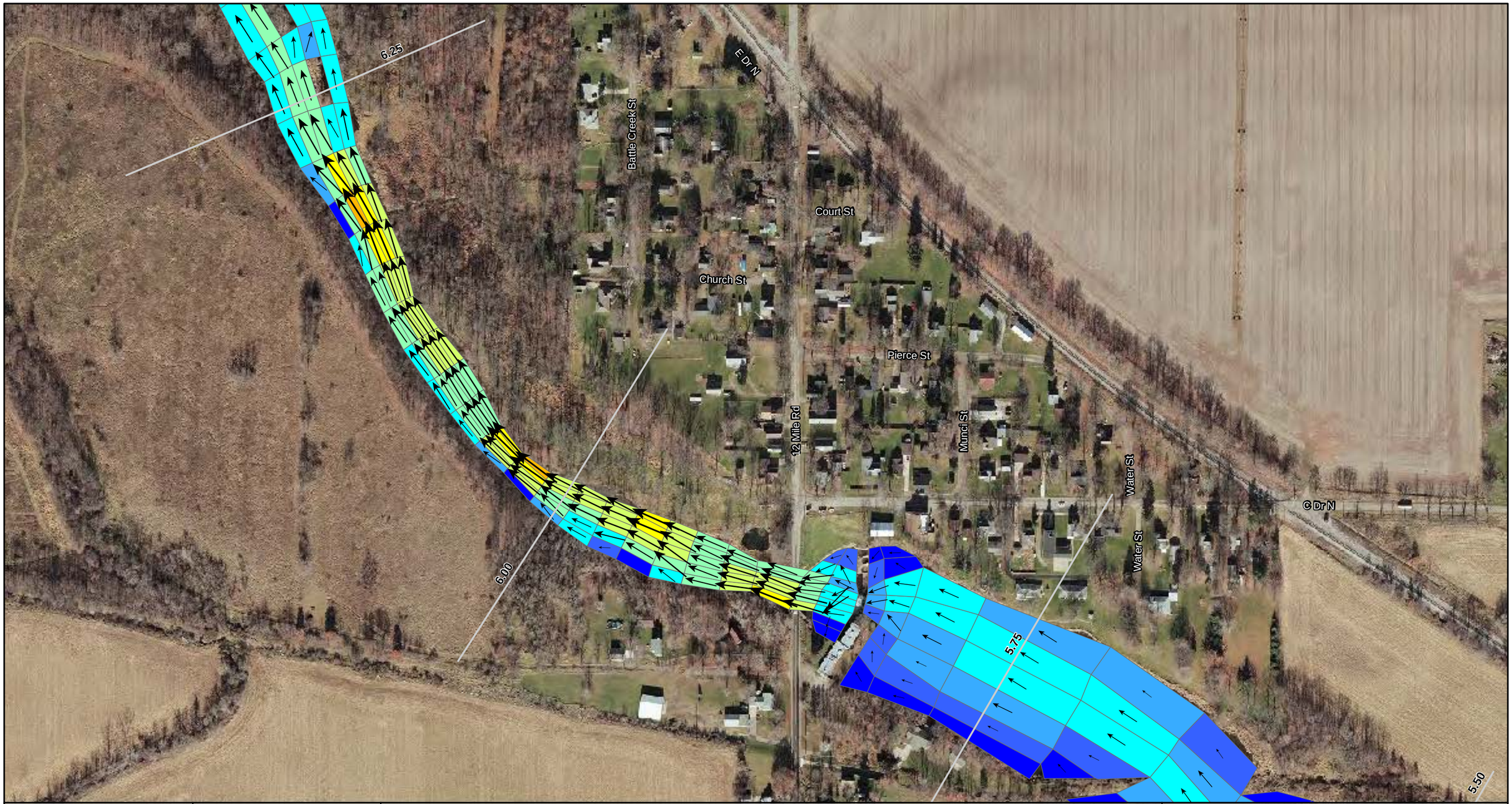
MP 04.90 - MP 05.65

SHEET 5 OF 56

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Aerial Photography Date: November 2011



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Drawn:	BRS	3/23/2012
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Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

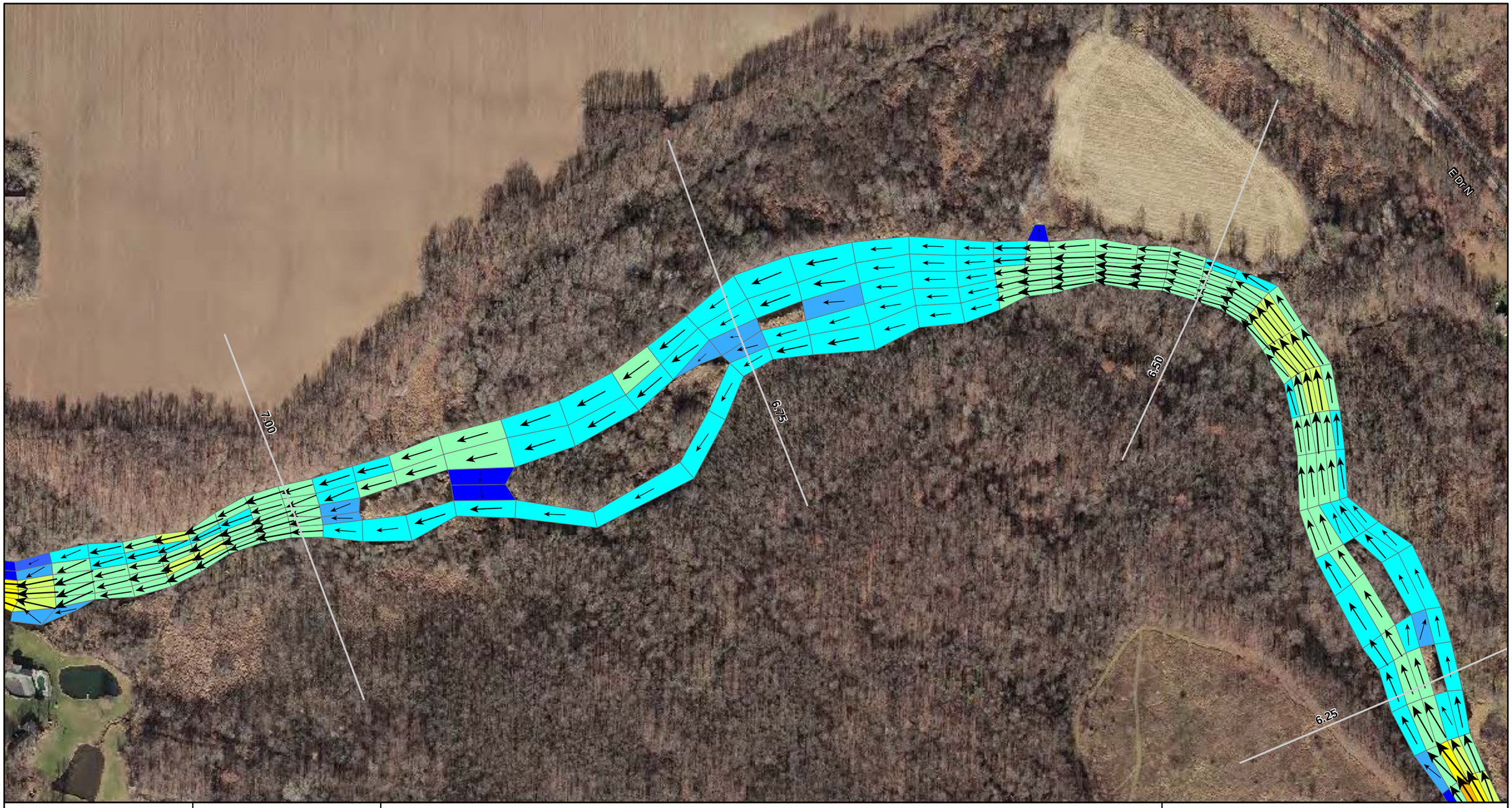
MP 05.65 - MP 06.30

SHEET 6 OF 56

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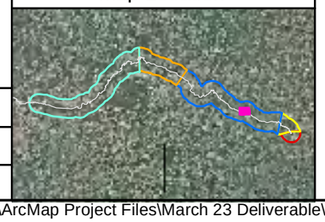
Aerial Photography Date: November 2011



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Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

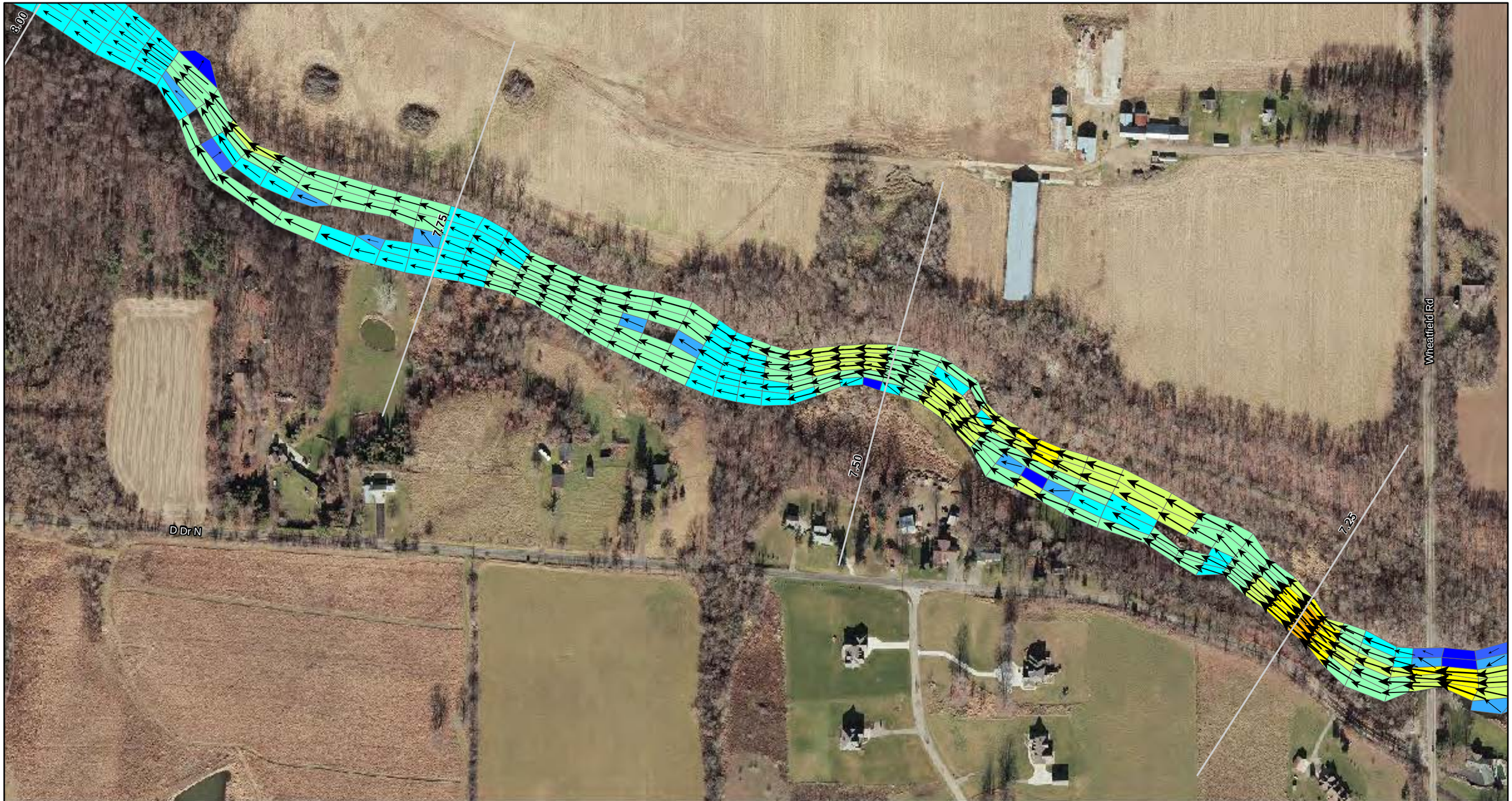
MP 06.20 - MP 07.15

SHEET 7 OF 56

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Aerial Photography Date: November 2011



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Drawn:	BRS	3/23/2012
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Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

MP 07.15 - MP 07.95

SHEET 8 OF 56

ENBRIDGE LINE 6B MP 608
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Aerial Photography Date: November 2011

8.75

8.50

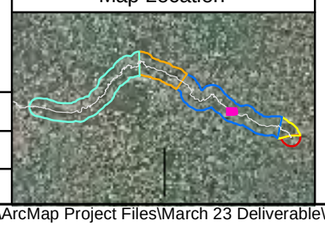
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Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

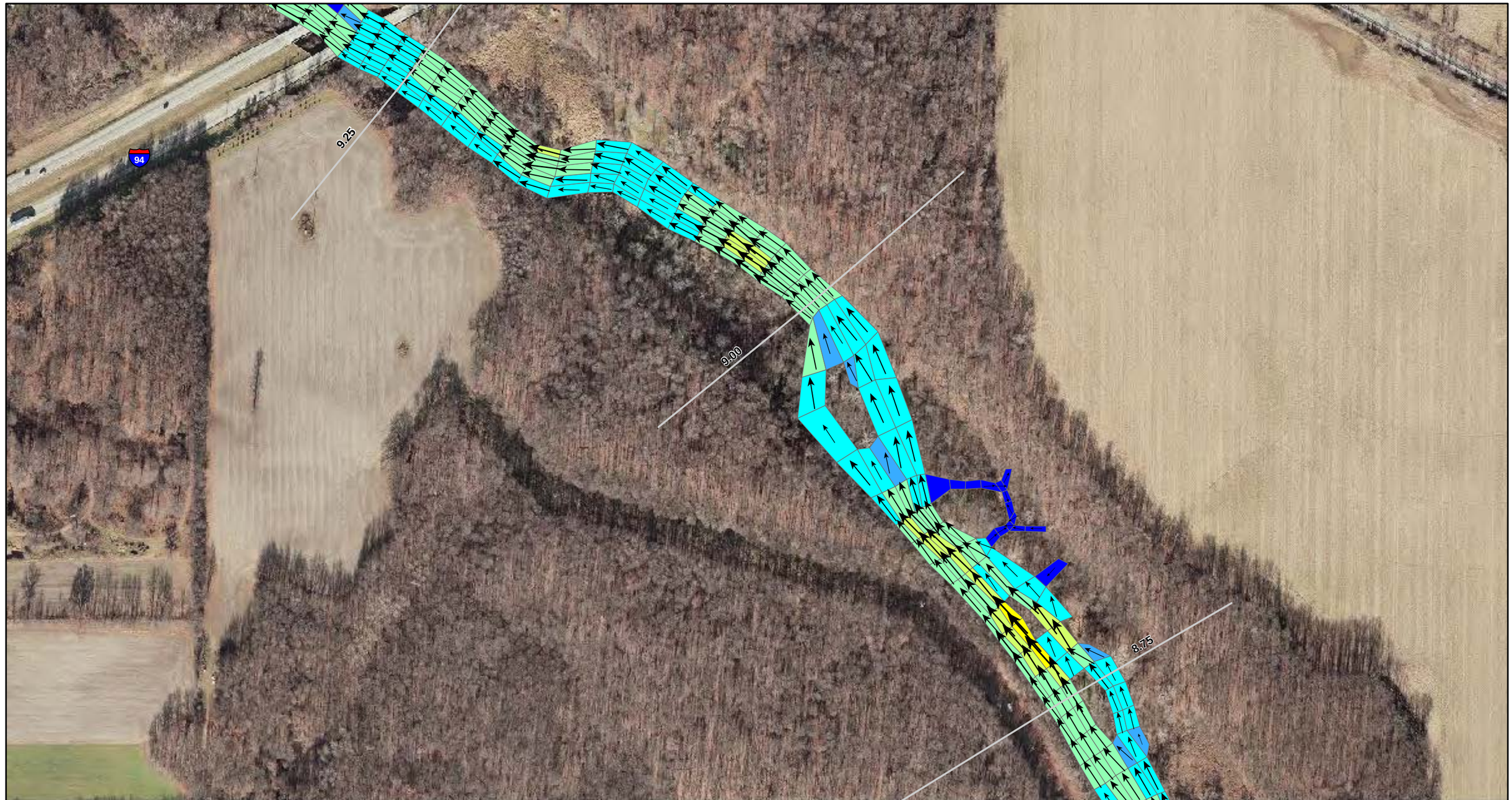
MP 07.90 - MP 08.75

SHEET 9 OF 56

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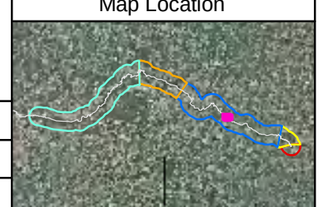
Aerial Photography Date: November 2011



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Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

MP 08.70 - MP 09.30

SHEET 10 OF 56

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Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

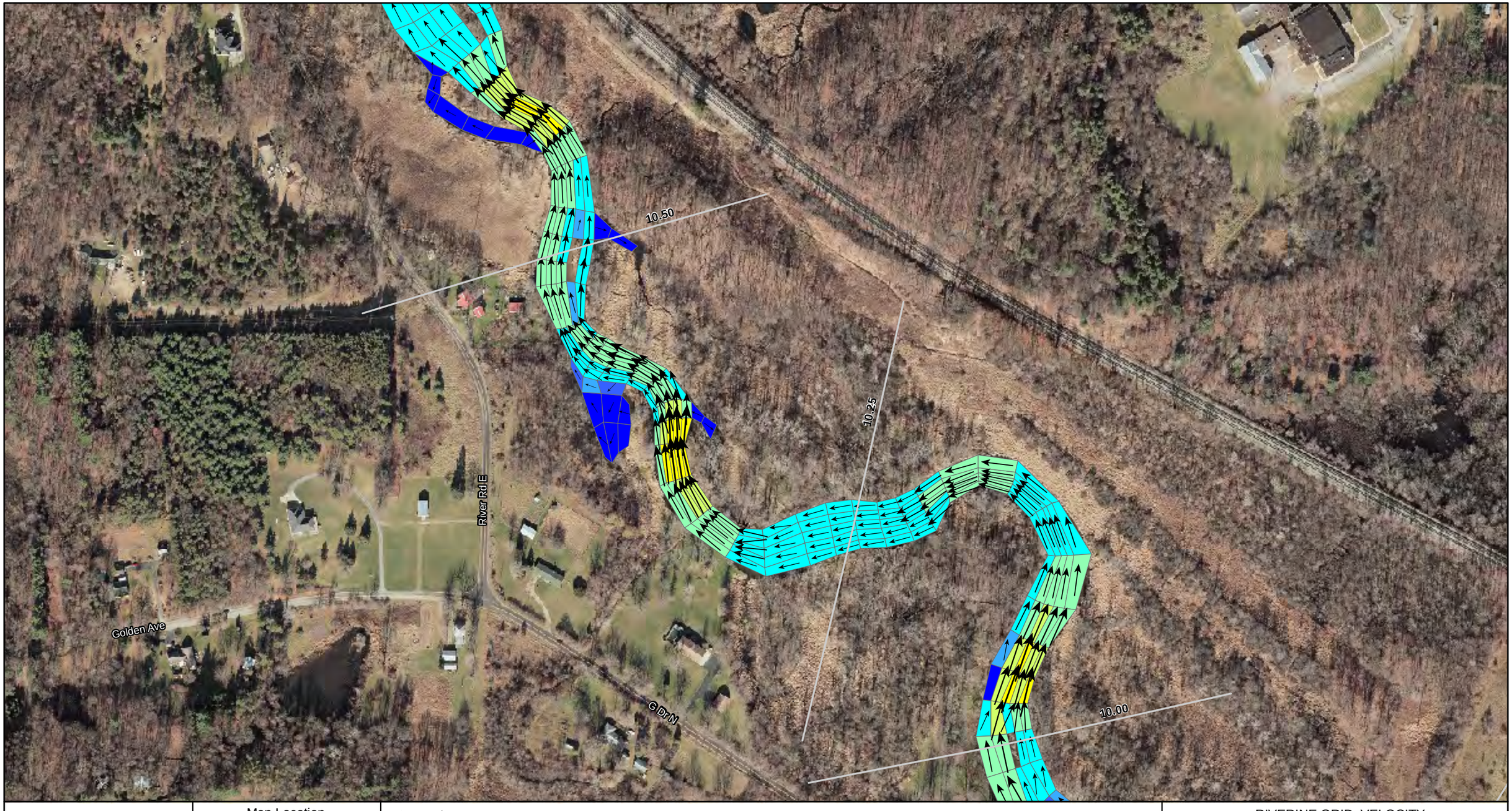
MP 09.25 - MP 10.05

SHEET 11 OF 56

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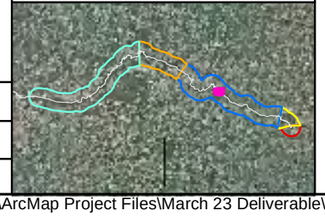
Aerial Photography Date: November 2011



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Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

MP 10.00 - MP 10.65

SHEET 12 OF 56

ENBRIDGE LINE 6B MP 608
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ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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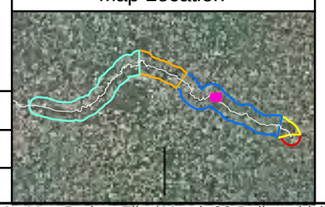
Aerial Photography Date: November 2011



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Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

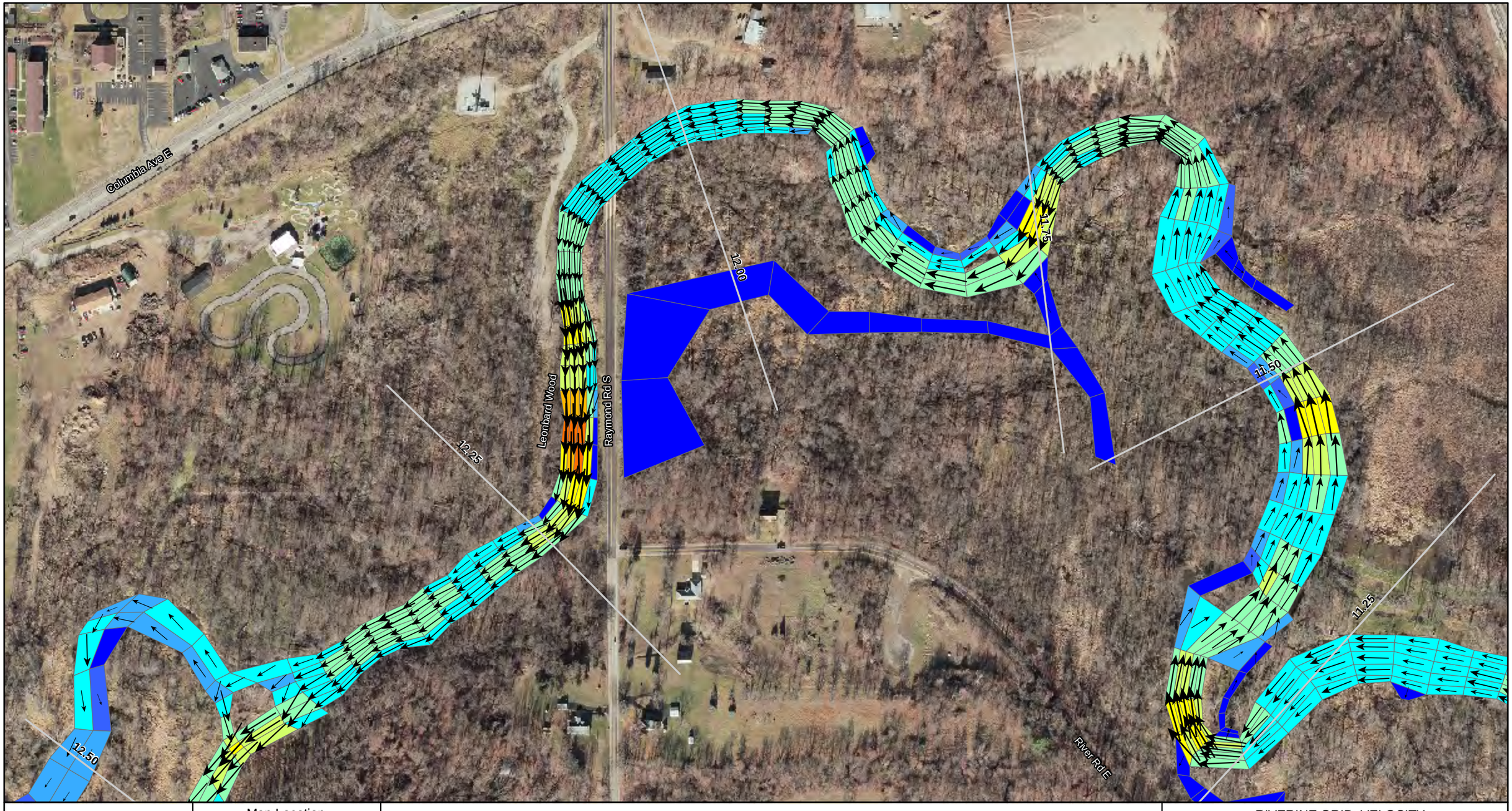
MP 10.60 - MP 11.40

SHEET 13 OF 56

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Aerial Photography Date: November 2011



Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

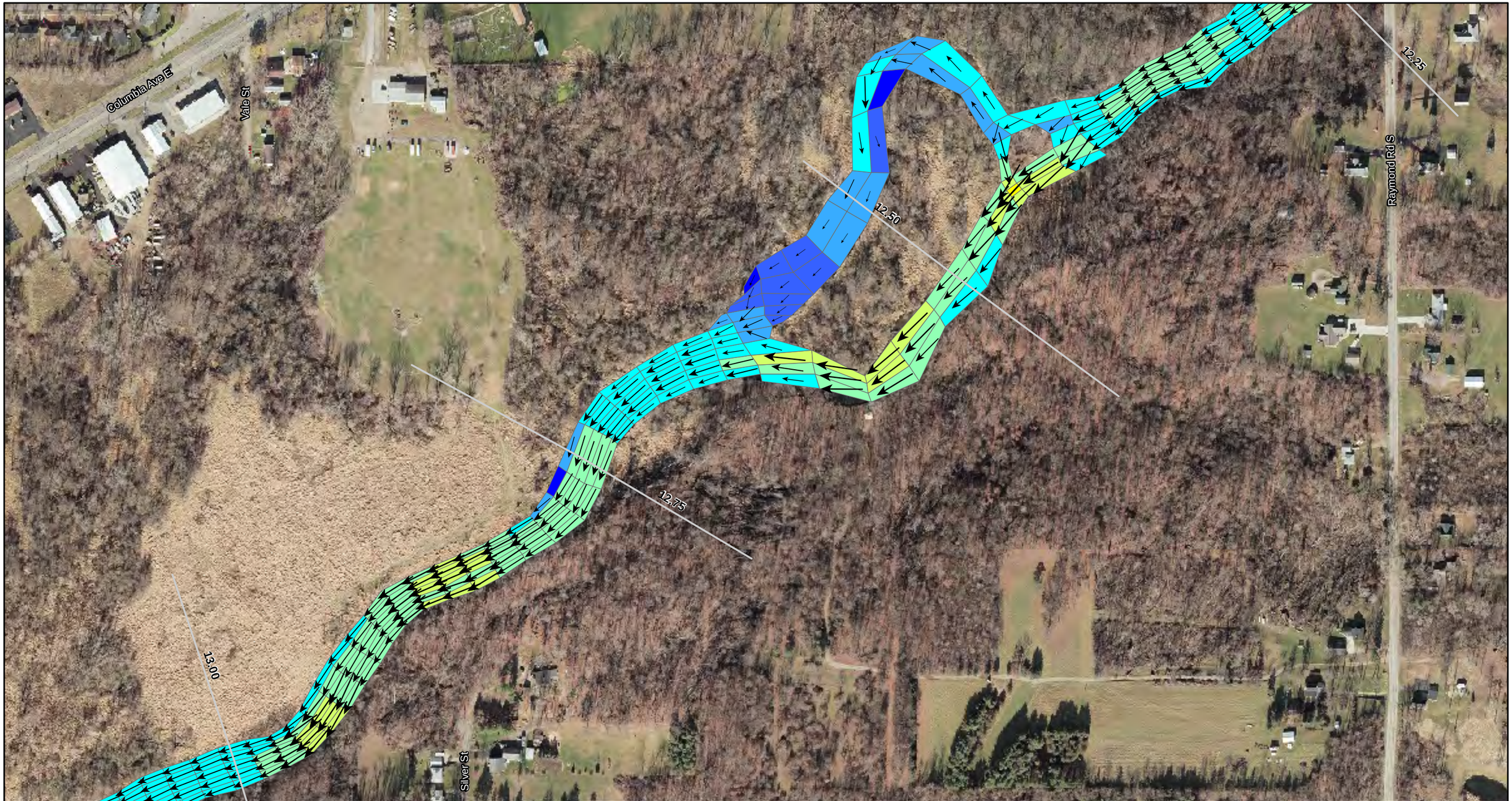
MP 11.10 - MP 12.45

SHEET 14 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep8_2010.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

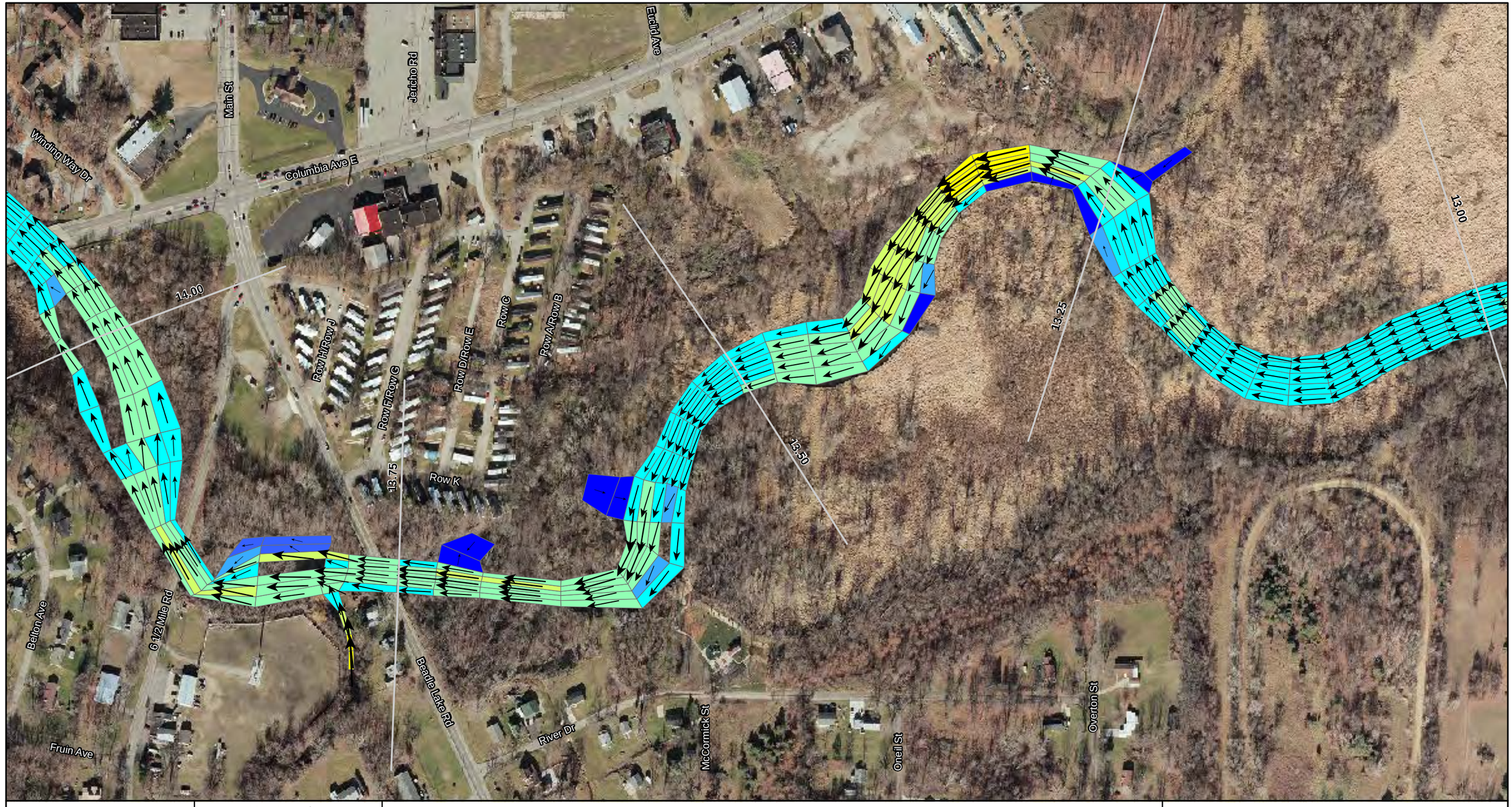
MP 12.30 - MP 13.05

SHEET 15 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep8_2010.mxd

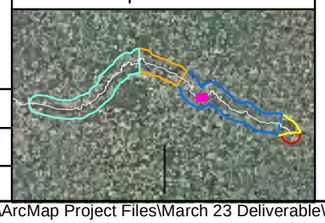
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

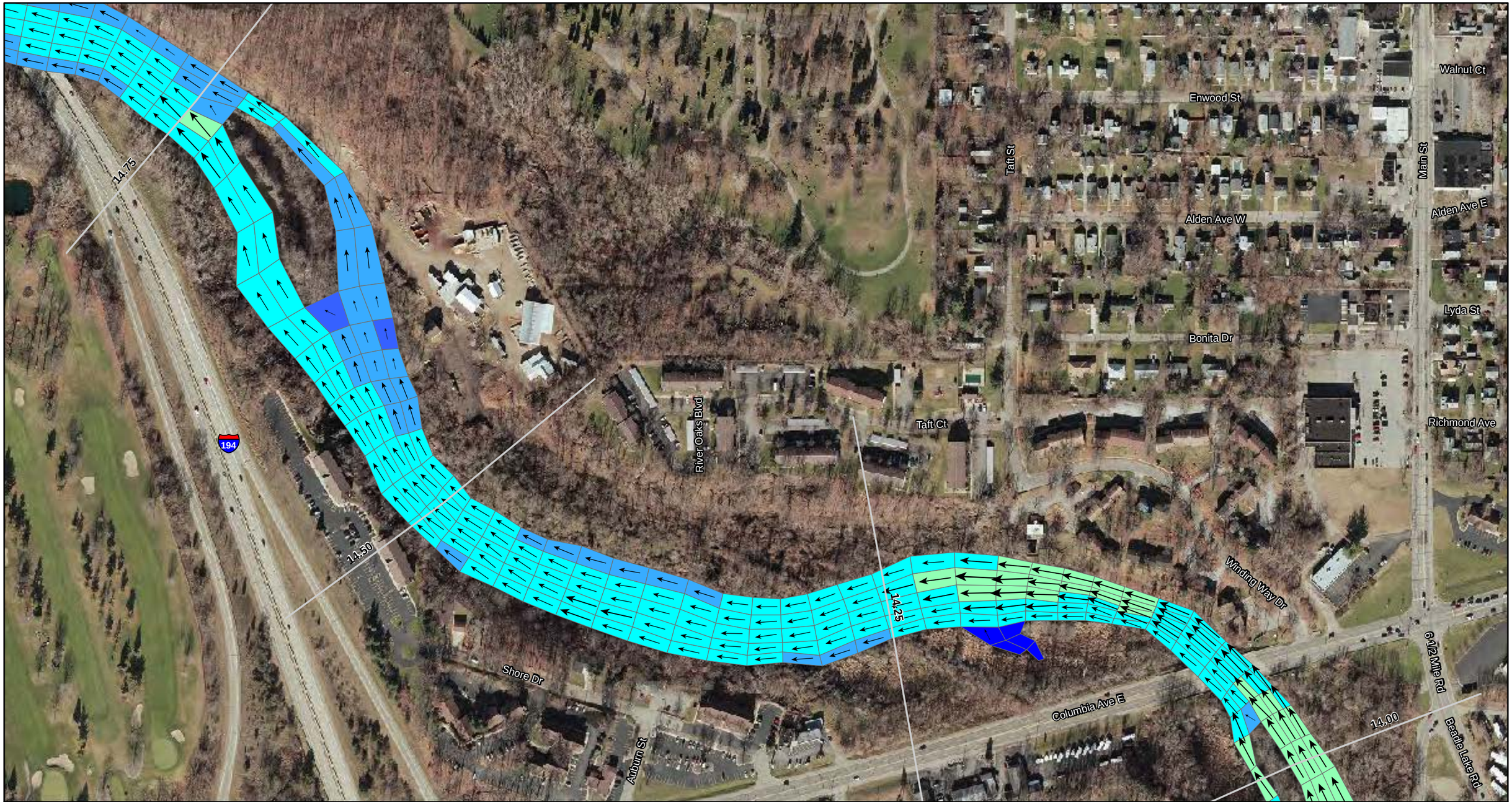
MP 13.00 - MP 14.10

SHEET 16 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep8_2010.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

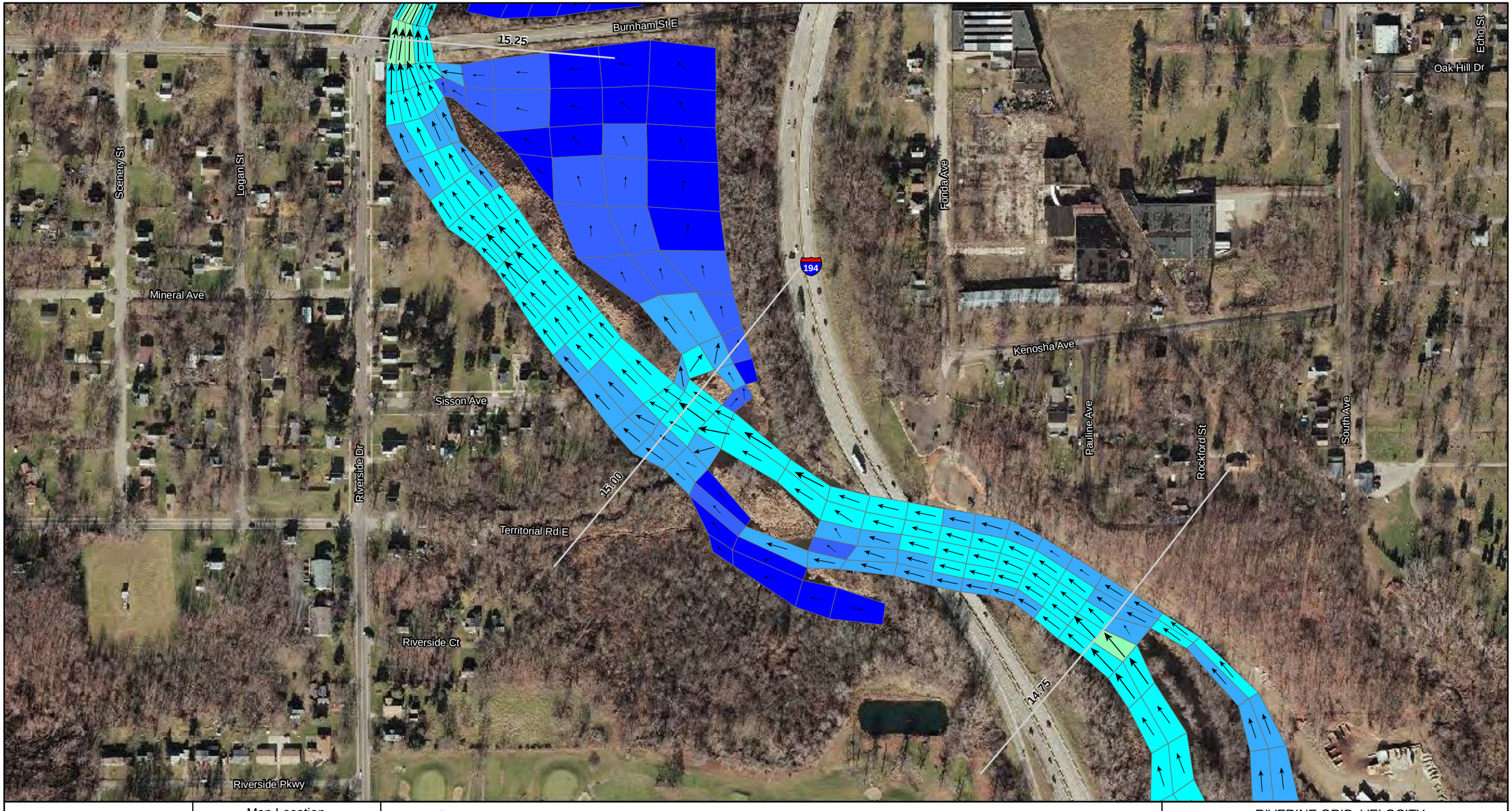
MP 14.00 - MP 14.85

SHEET 17 OF 56

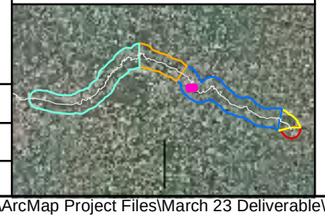
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep8_2010.mxd

Aerial Photography Date: November 2011



Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

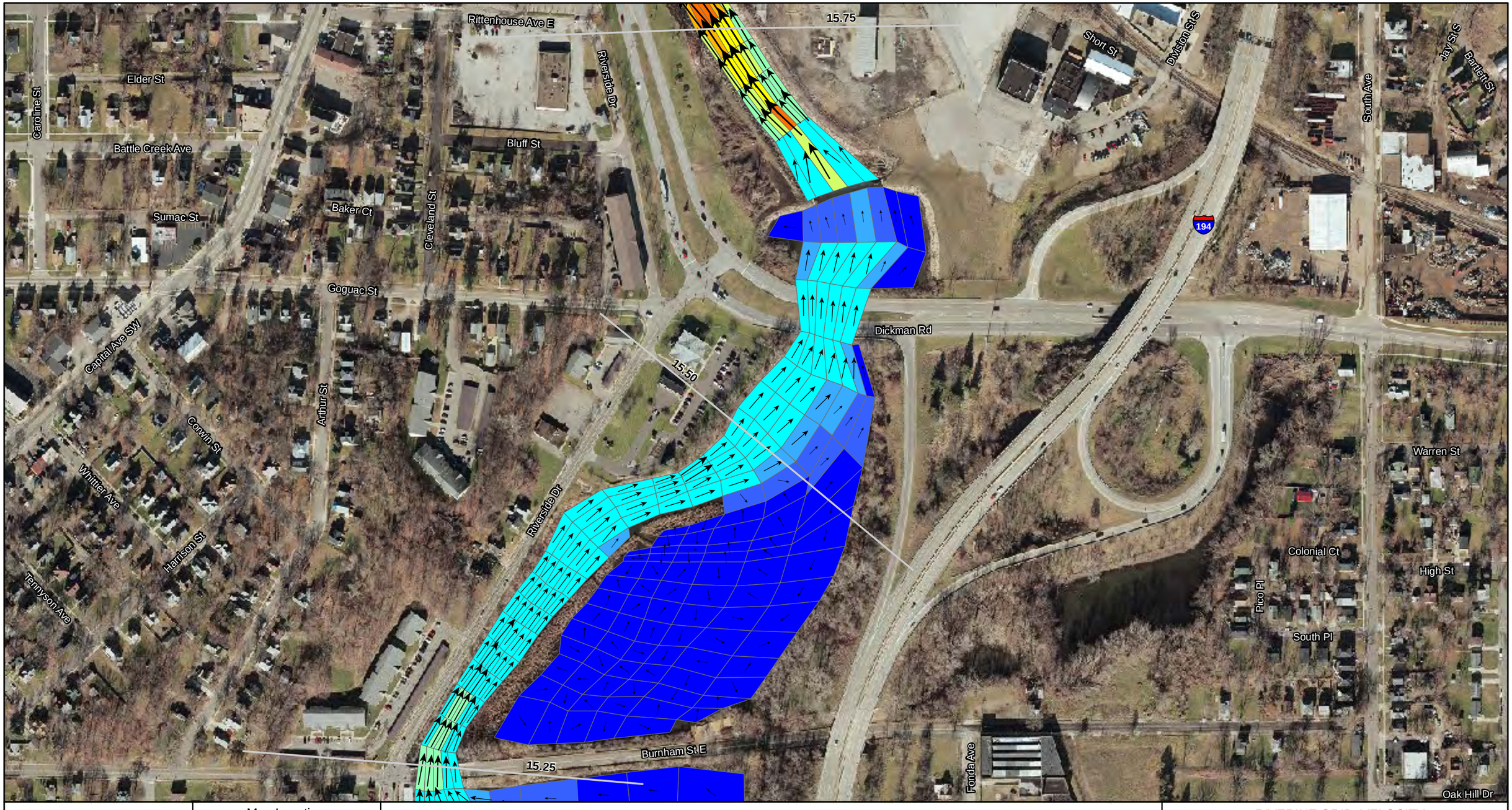
MP 14.65 - MP 15.25

SHEET 18 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep8_2010.mxd

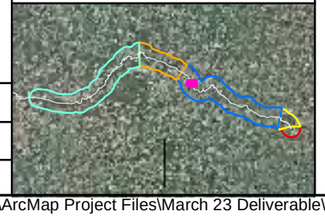
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

MP 15.25 - MP 15.75

SHEET 19 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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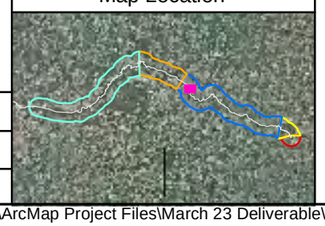
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

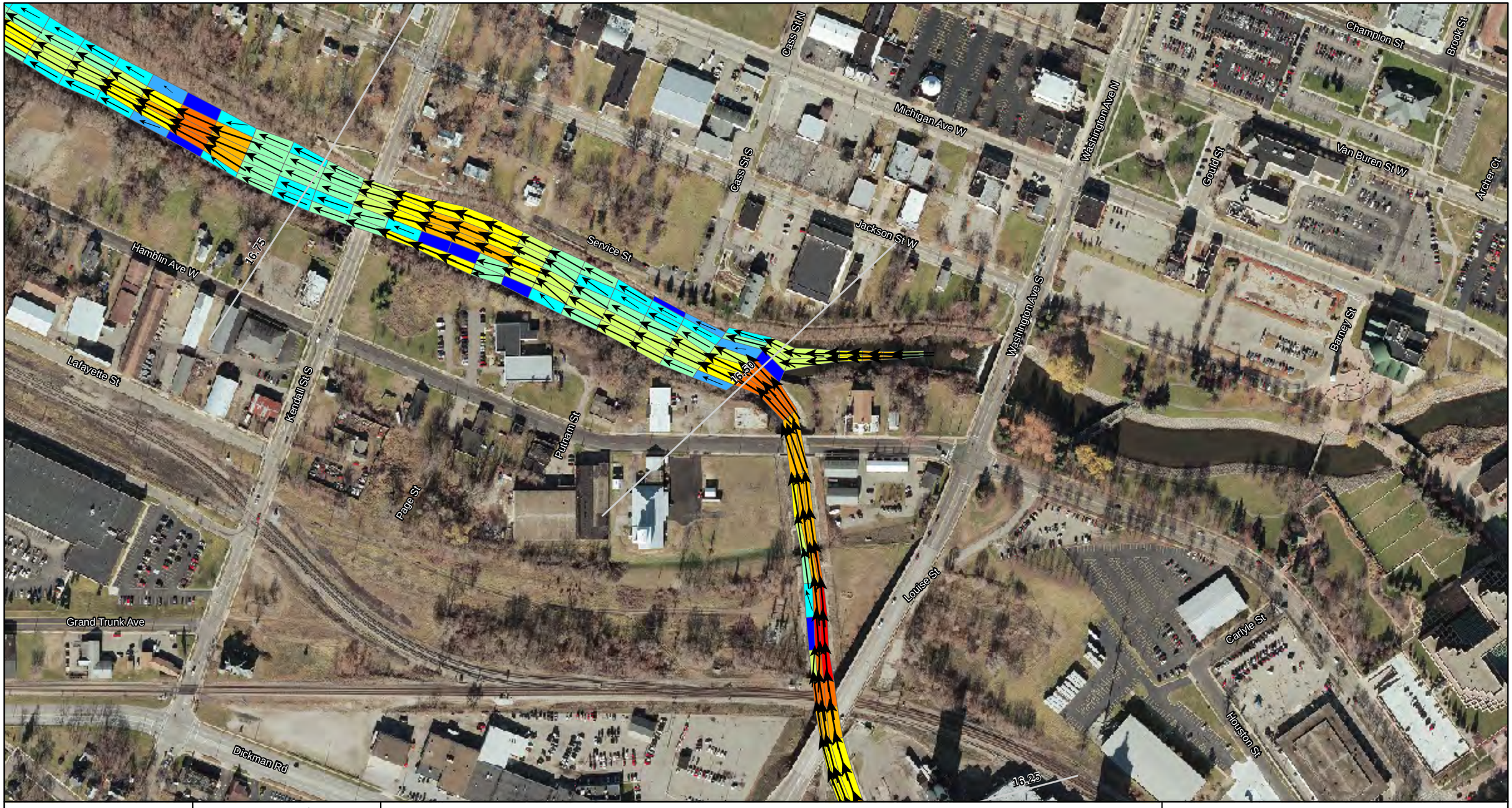
MP 15.75 - MP 16.30

SHEET 20 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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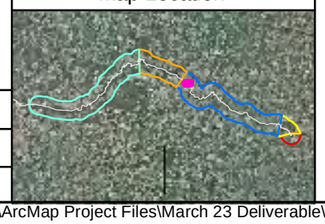
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

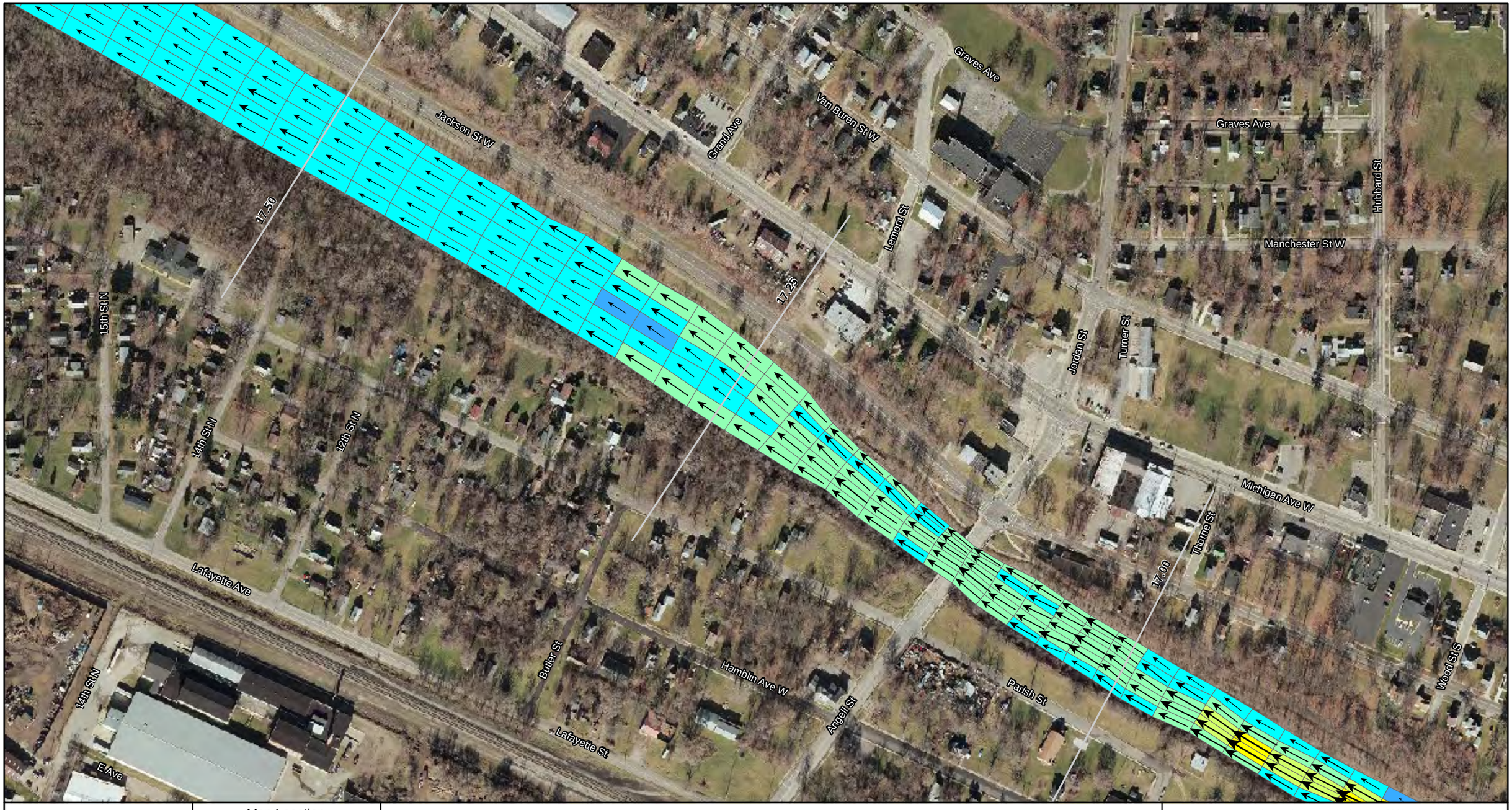
MP 16.30 - MP 16.95

SHEET 21 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep8_2010.mxd

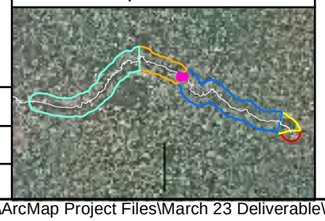
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

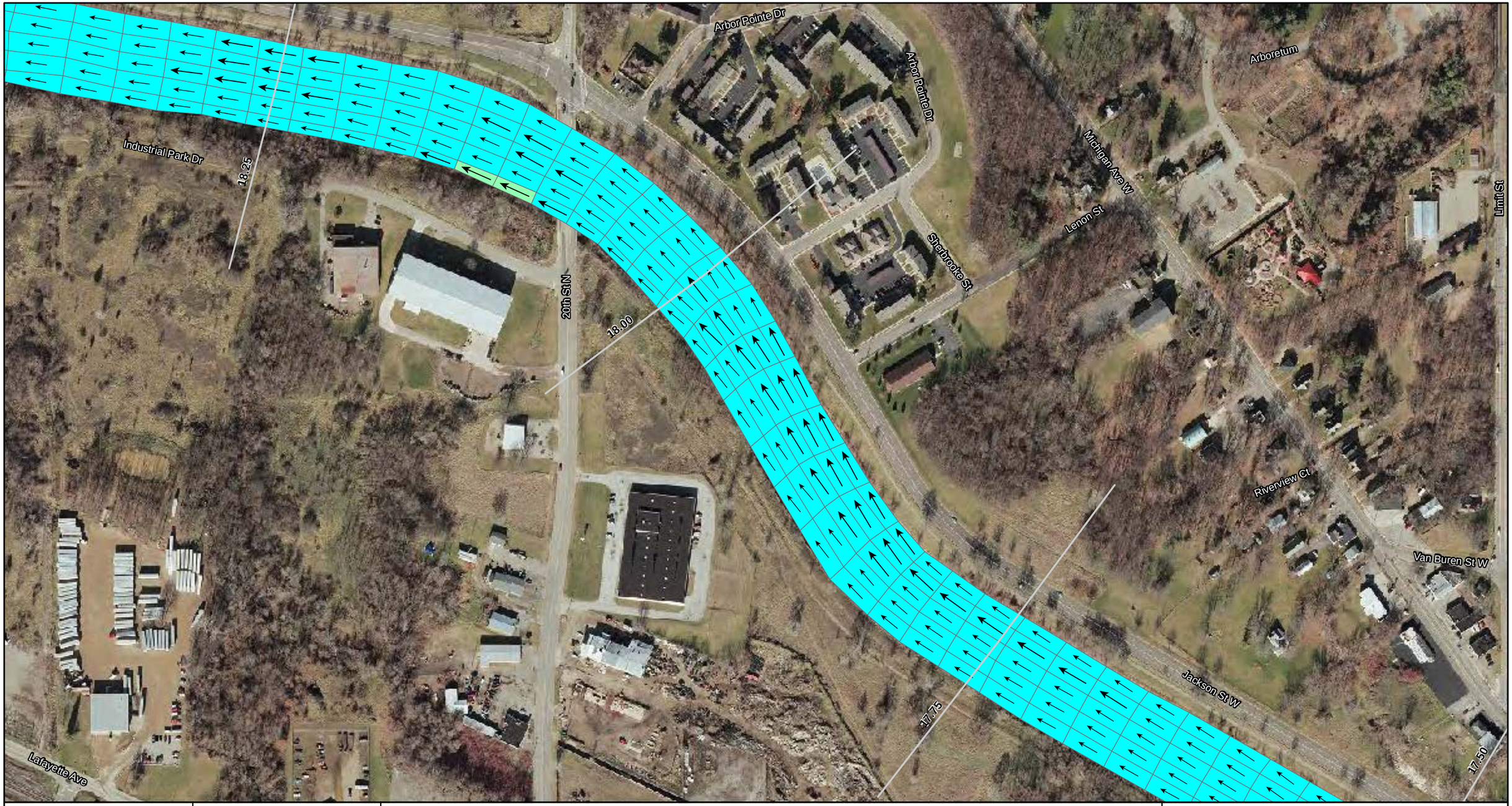
MP 16.85 - MP 17.60

SHEET 22 OF 56

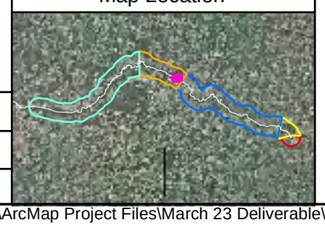
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

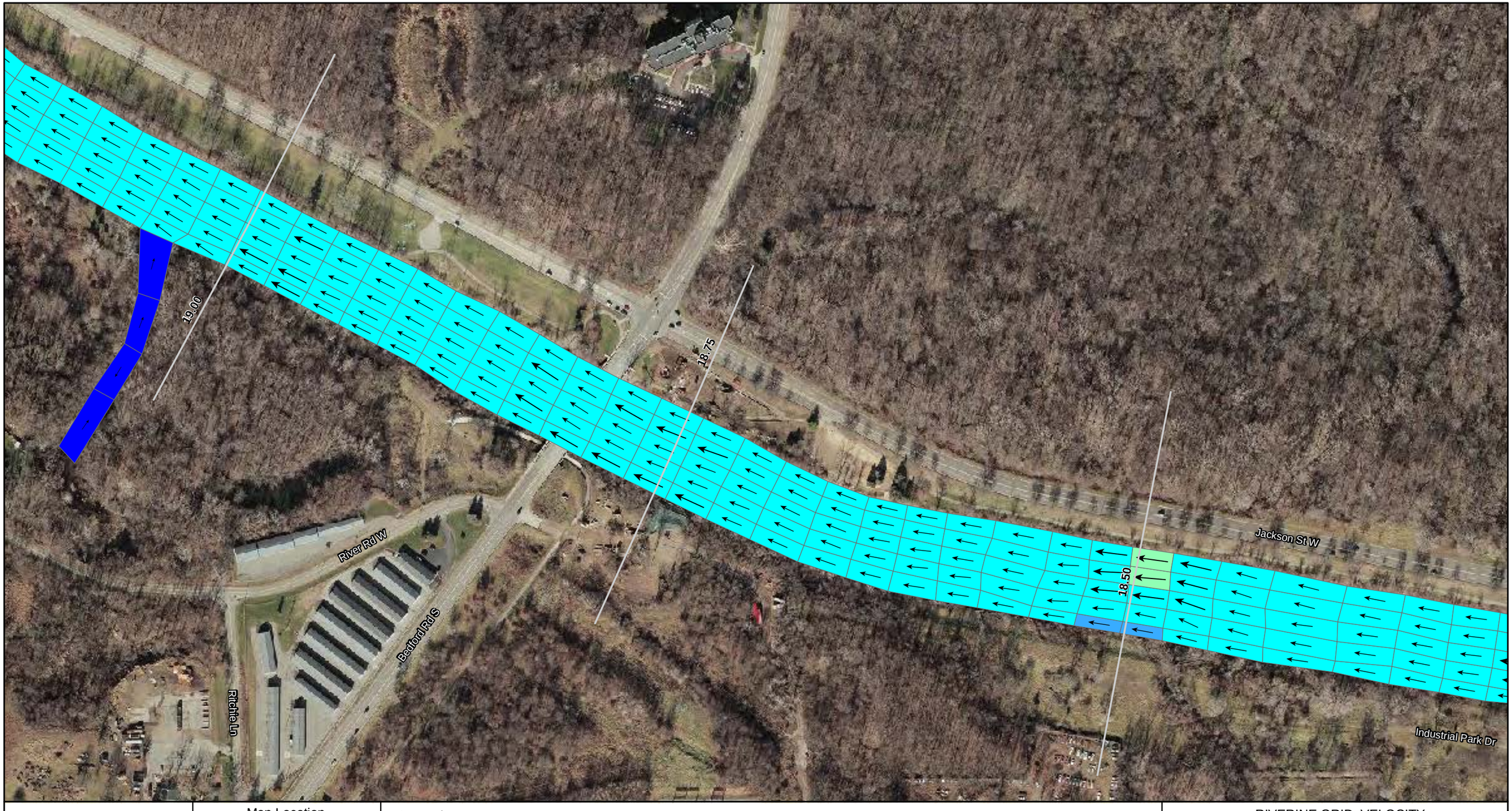
MP 17.60 - MP 18.40

SHEET 23 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep8_2010.mxd

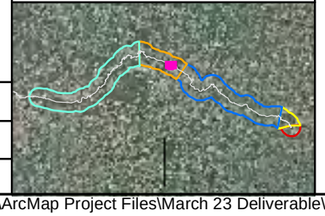
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

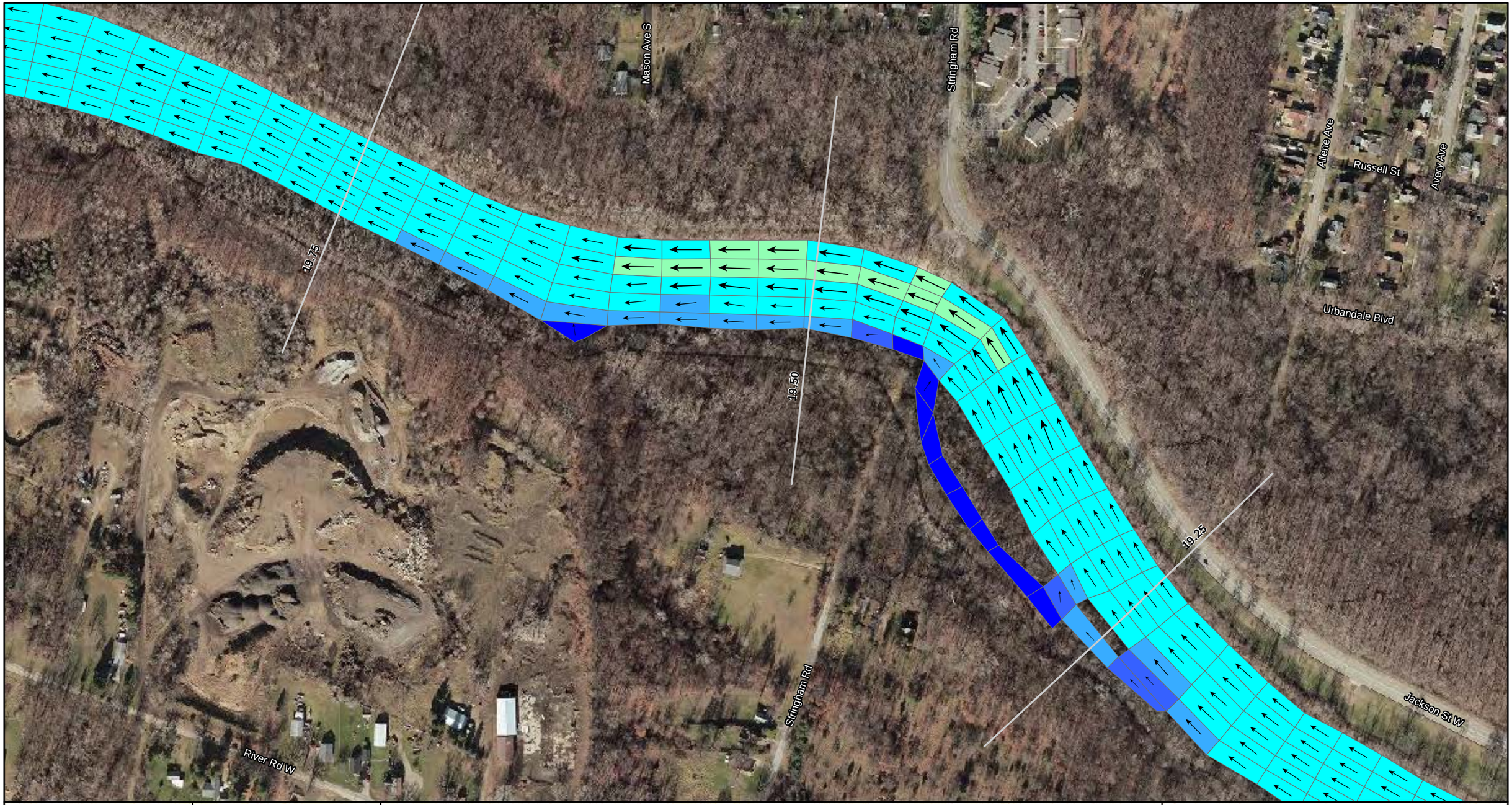
MP 18.30 - MP 19.15

SHEET 24 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep8_2010.mxd

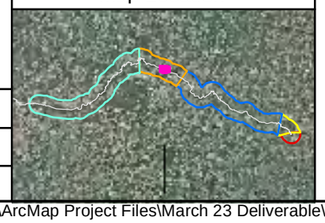
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

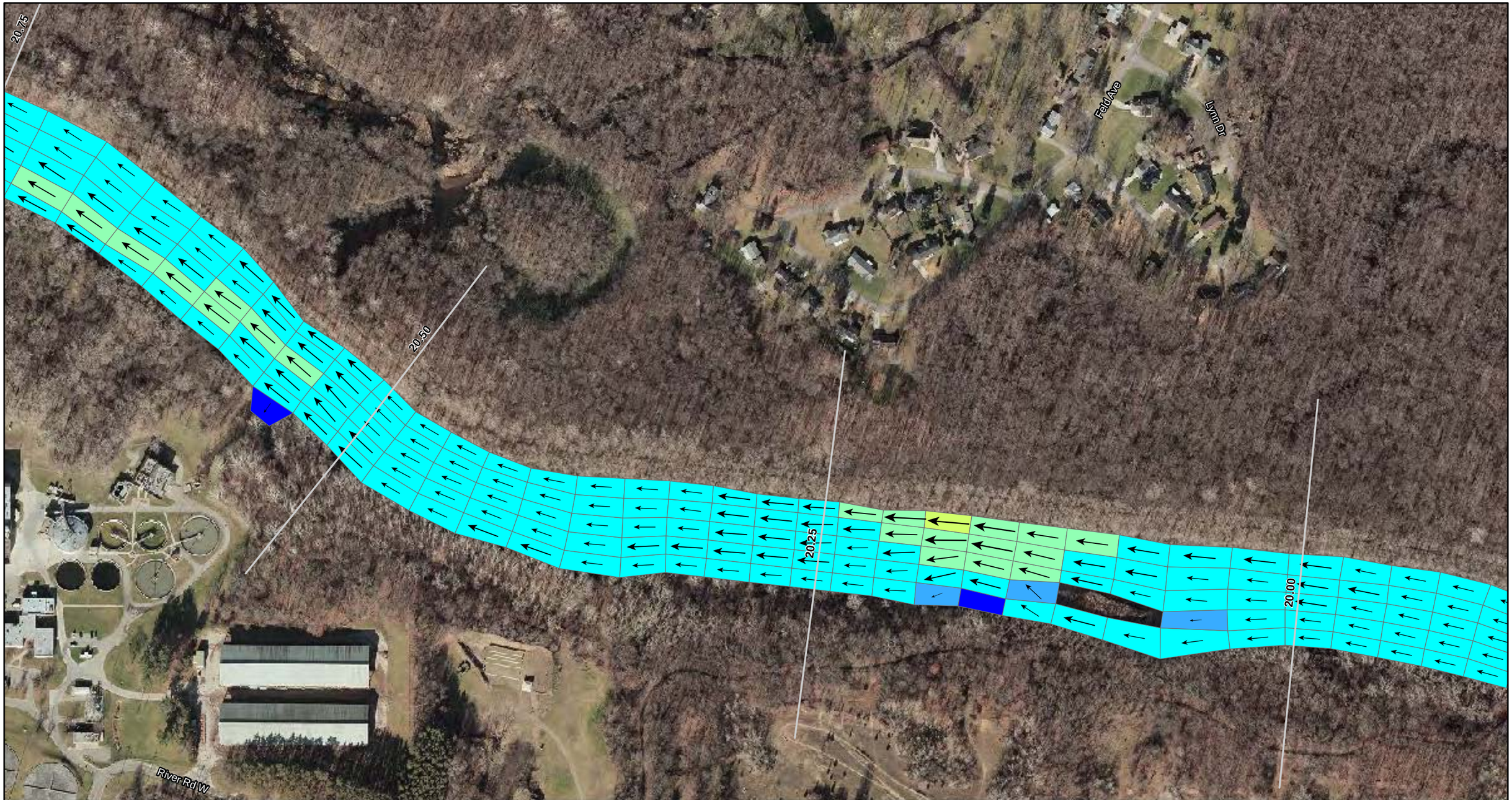
MP 19.10 - MP 19.95

SHEET 25 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

MP 19.90 - MP 20.75

SHEET 26 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

Coldwater Ave

Custer Dr

Stillson Blvd

21.25

21.00

20.75

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

MP 20.70 - MP 21.50

SHEET 27 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

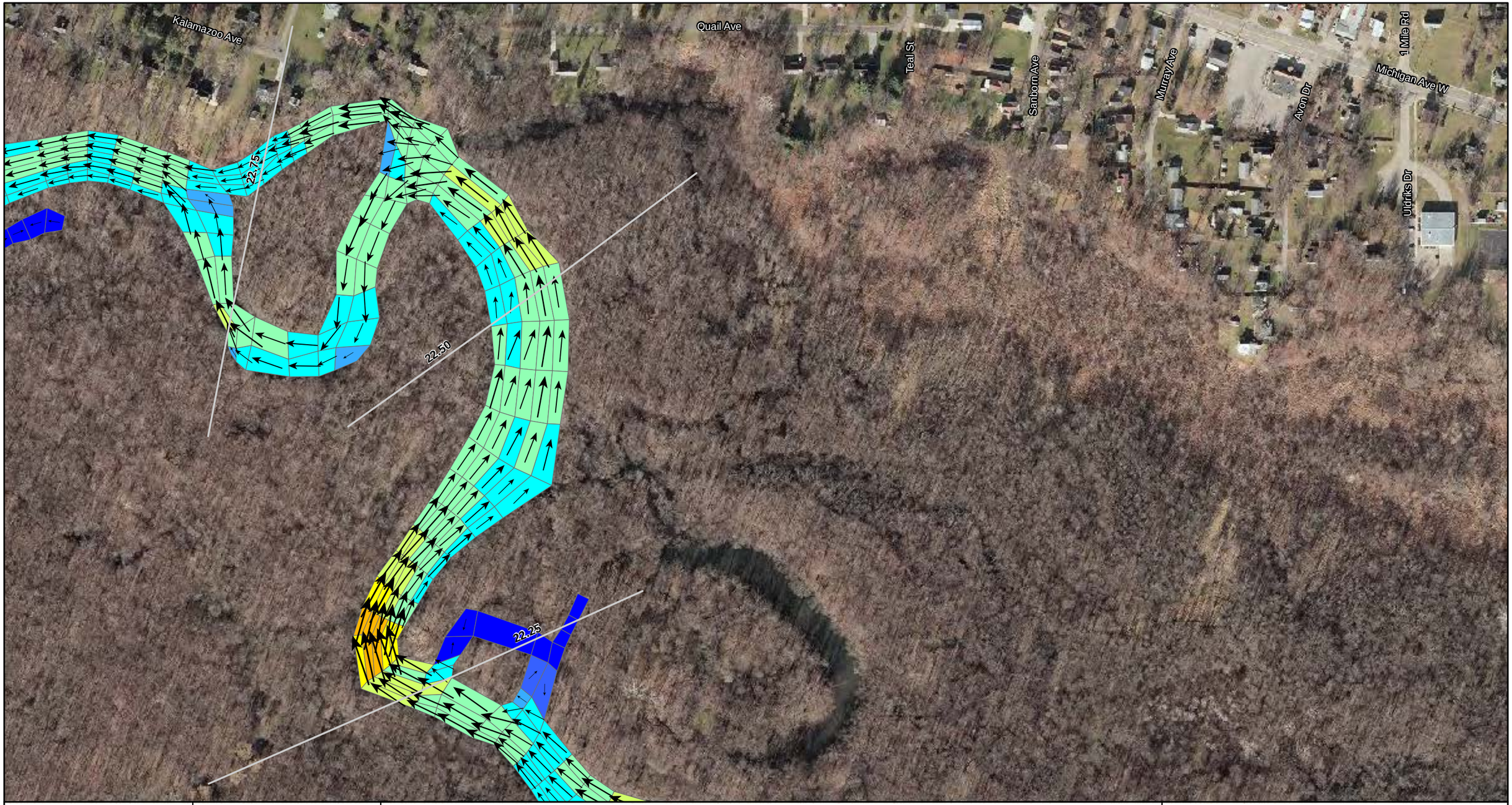
MP 21.35 - MP 22.15

SHEET 28 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep8_2010.mxd

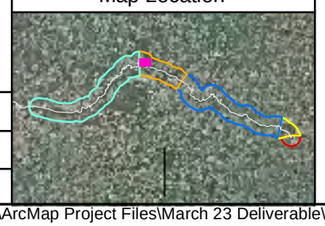
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

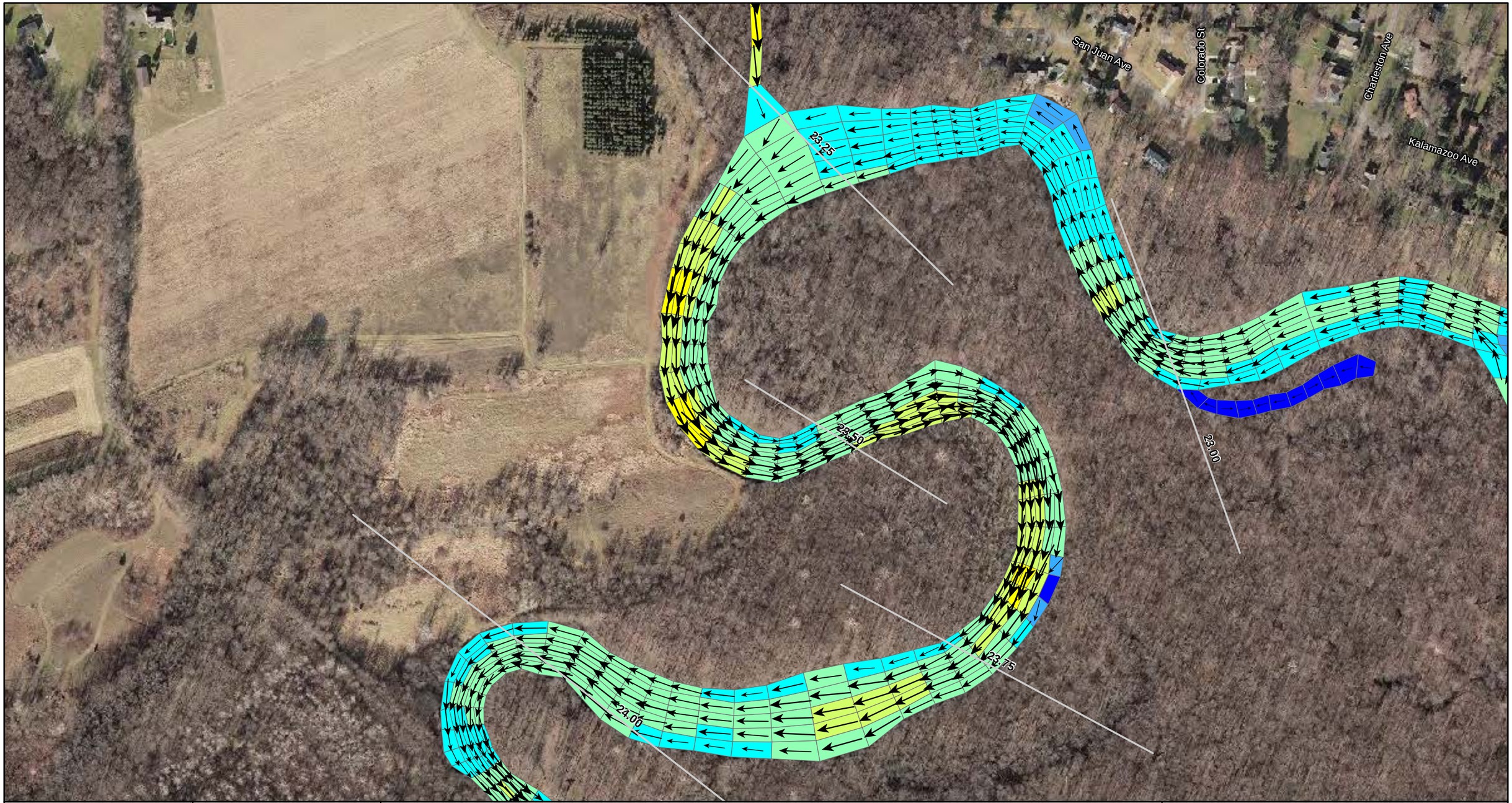
MP 22.15 - MP 22.90

SHEET 29 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

MP 22.80 - MP 24.10

SHEET 30 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

24.00
24.25
24.50
24.75
River Rd W
Fort Custer Dr
County Line Rd

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

MP 24.10 - MP 24.85

SHEET 31 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep8_2010.mxd

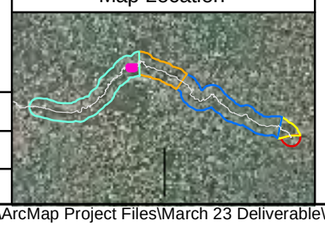
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

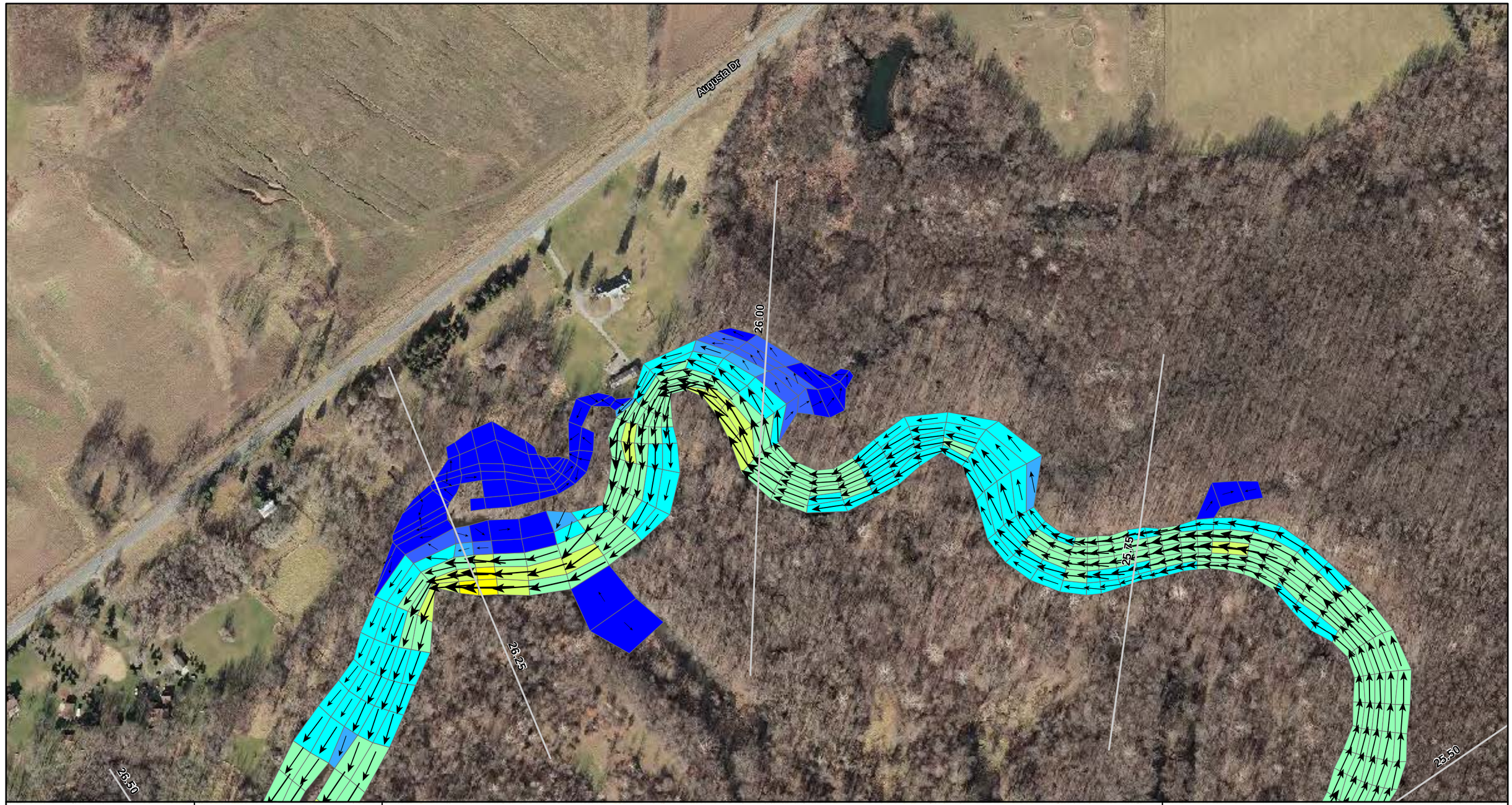
MP 24.80 - MP 25.65

SHEET 32 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep8_2010.mxd

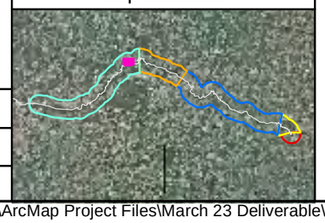
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

MP 25.55 - MP 26.40

SHEET 33 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

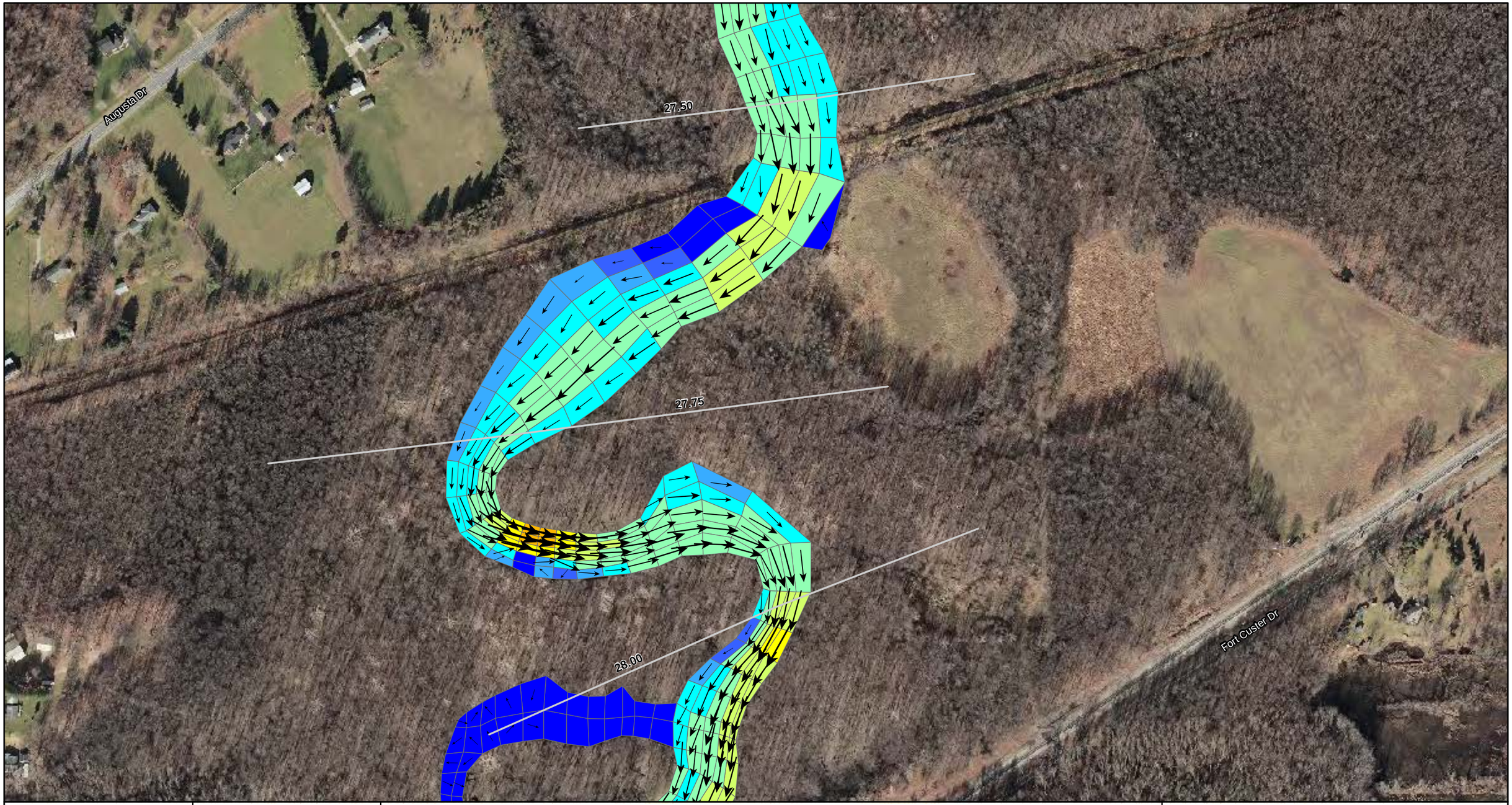
MP 26.40 - MP 27.45

SHEET 34 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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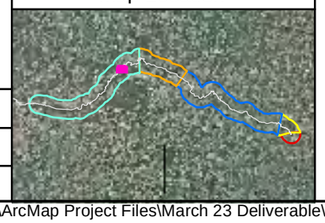
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

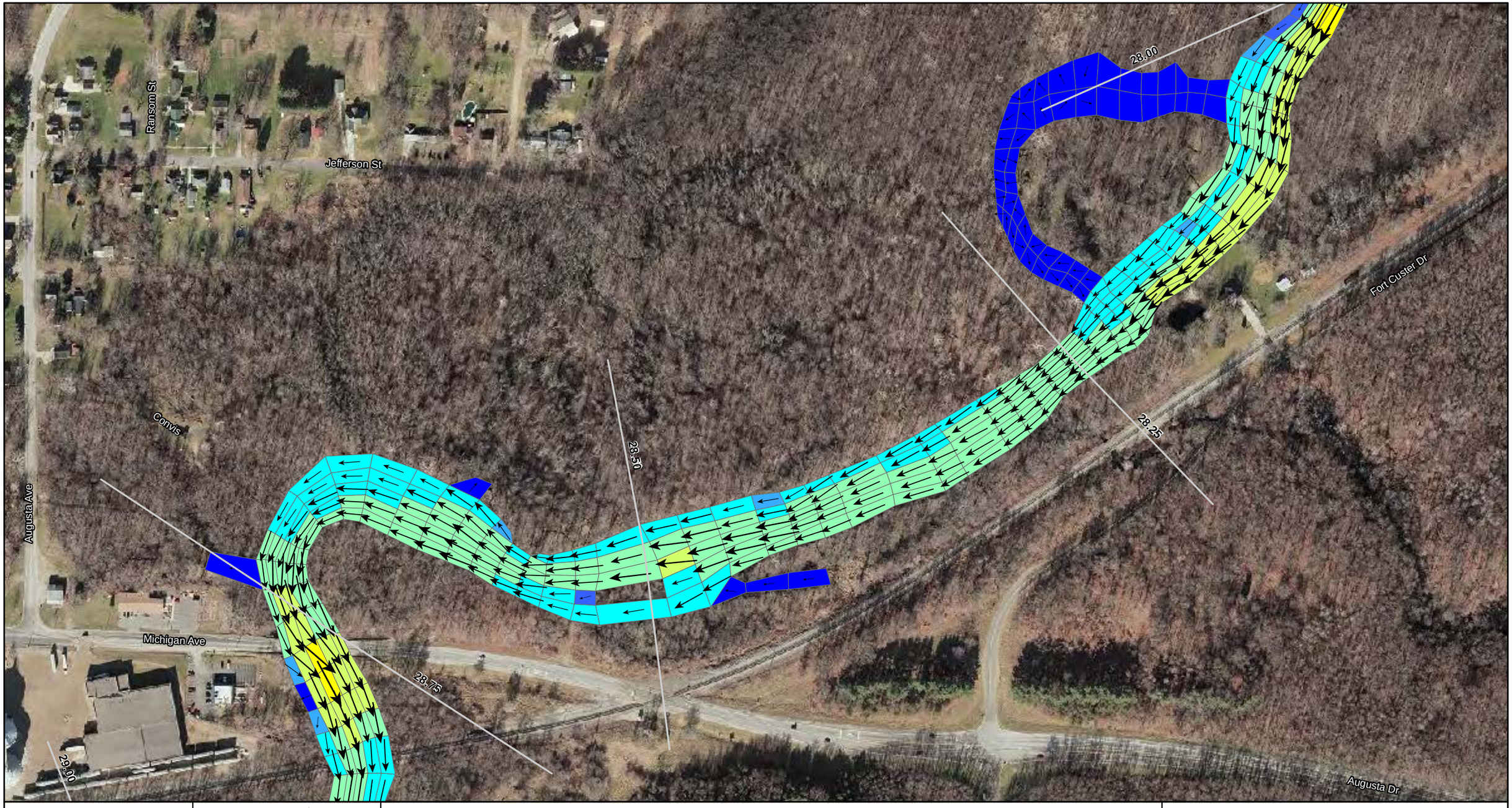
MP 27.45 - MP 28.10

SHEET 35 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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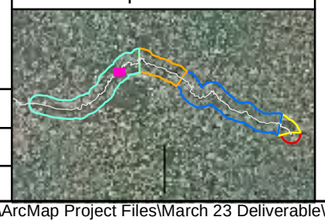
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

MP 28.05 - MP 28.85

SHEET 36 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

Clinton St
Clinton St
Chestnut St
Webster St
Church St
Fayette St
Cass St
Cherry St
Lincoln St
28.75
28.00
28.25
29.50
Augusta Climax Rd
Fort Custer Rec Area Access

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

MP 28.85 - MP29.55

SHEET 37 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

29.50

29.75

30.00

30.25

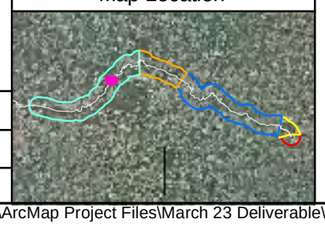
Fort Custer Rec Area Service

Fort Custer Rec Area Access

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

MP 29.50 - MP29.95

SHEET 38 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

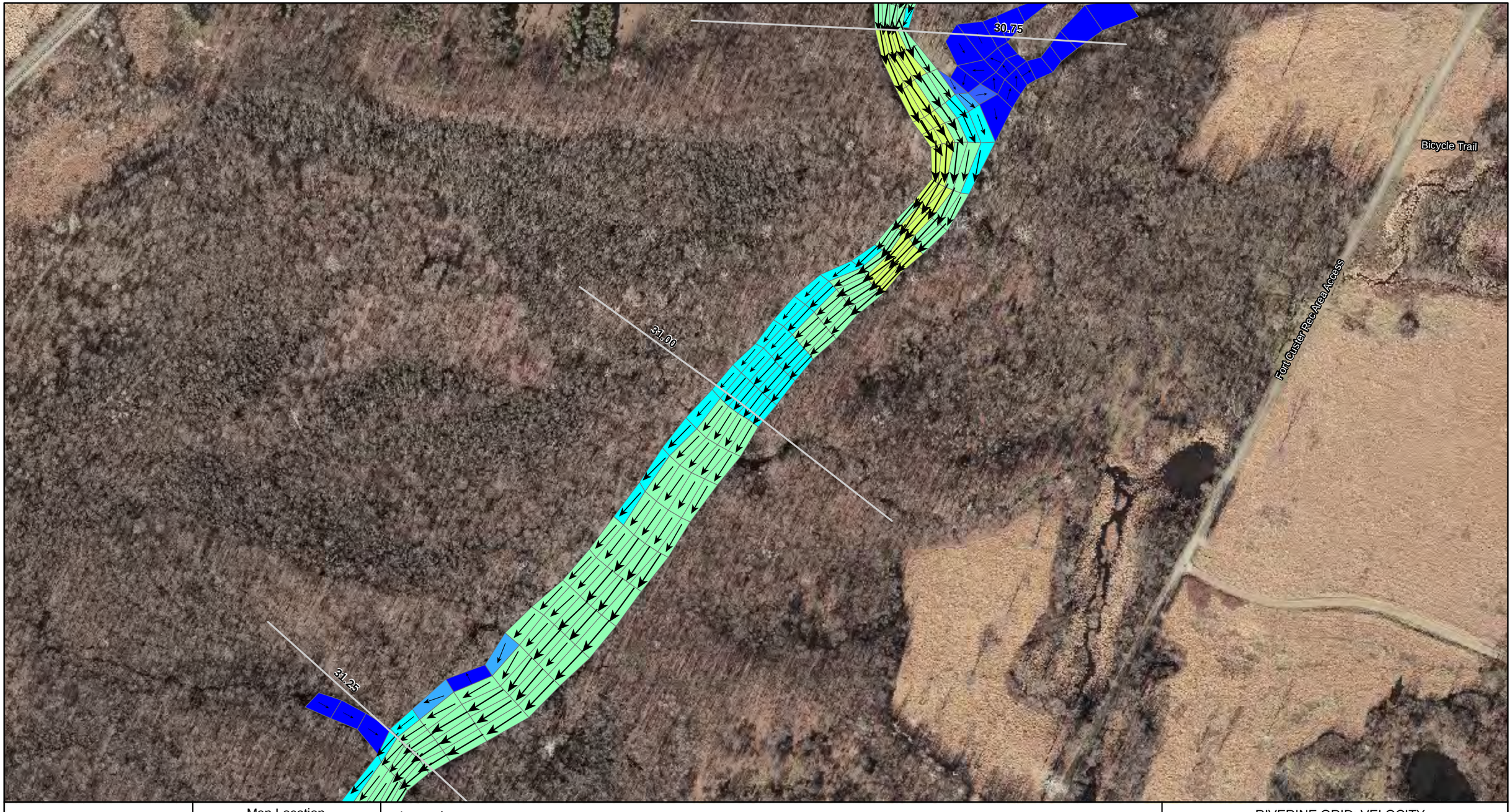
MP 29.95 - MP 30.80

SHEET 39 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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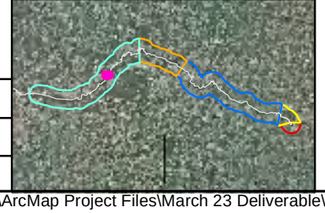
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

MP 30.75 - MP 31.25

SHEET 40 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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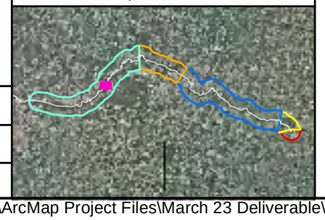
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

MP 31.25 - MP 31.70

SHEET 41 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep8_2010.mxd

Aerial Photography Date: November 2011

31.75

32.00

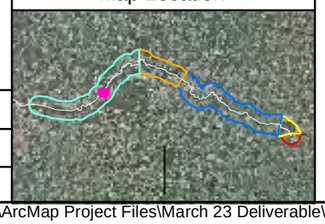
32.25

Bicycle Trail

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

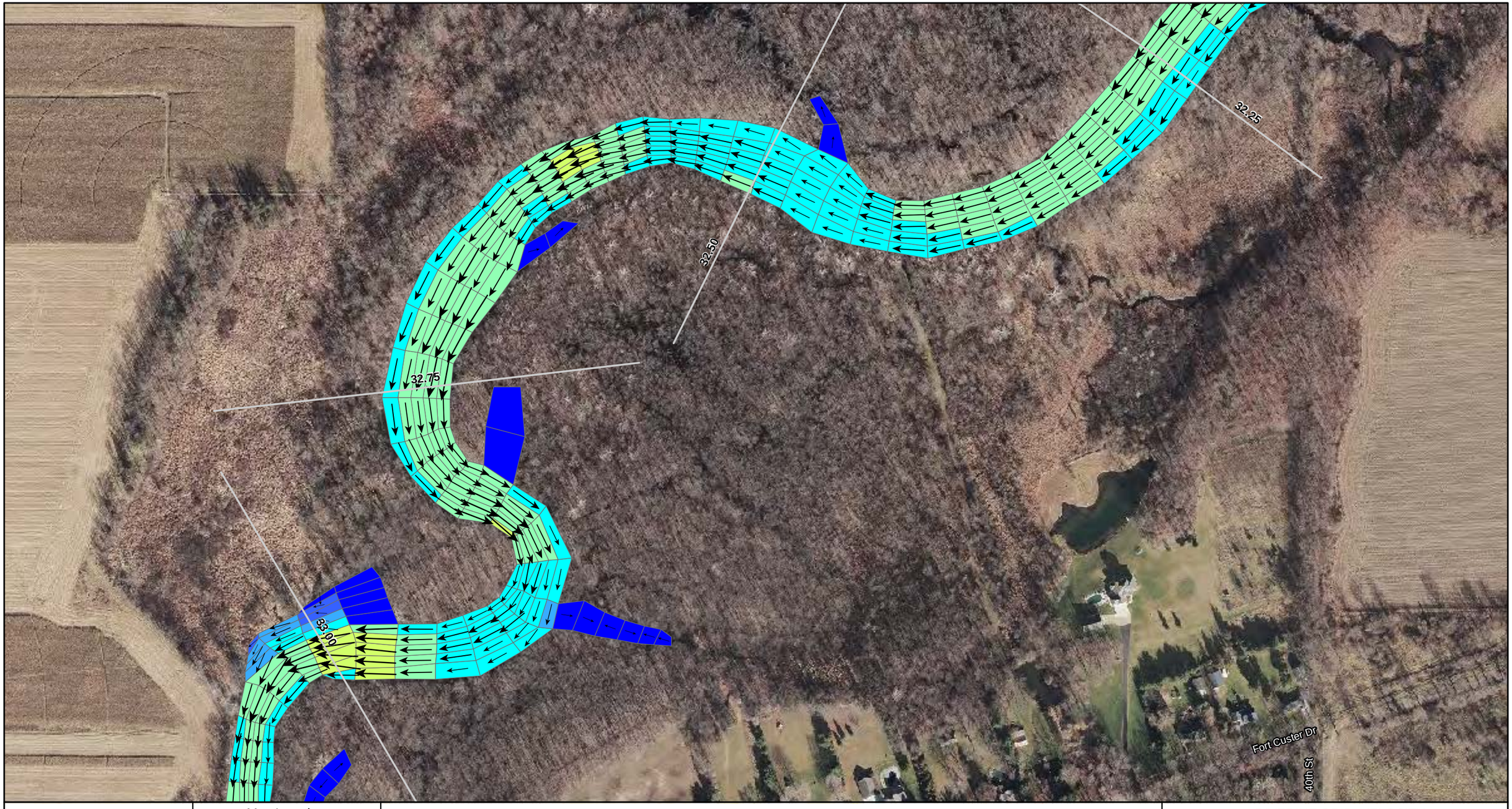
MP 31.65 - MP 32.25

SHEET 42 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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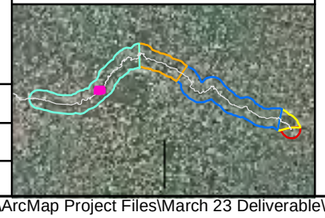
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

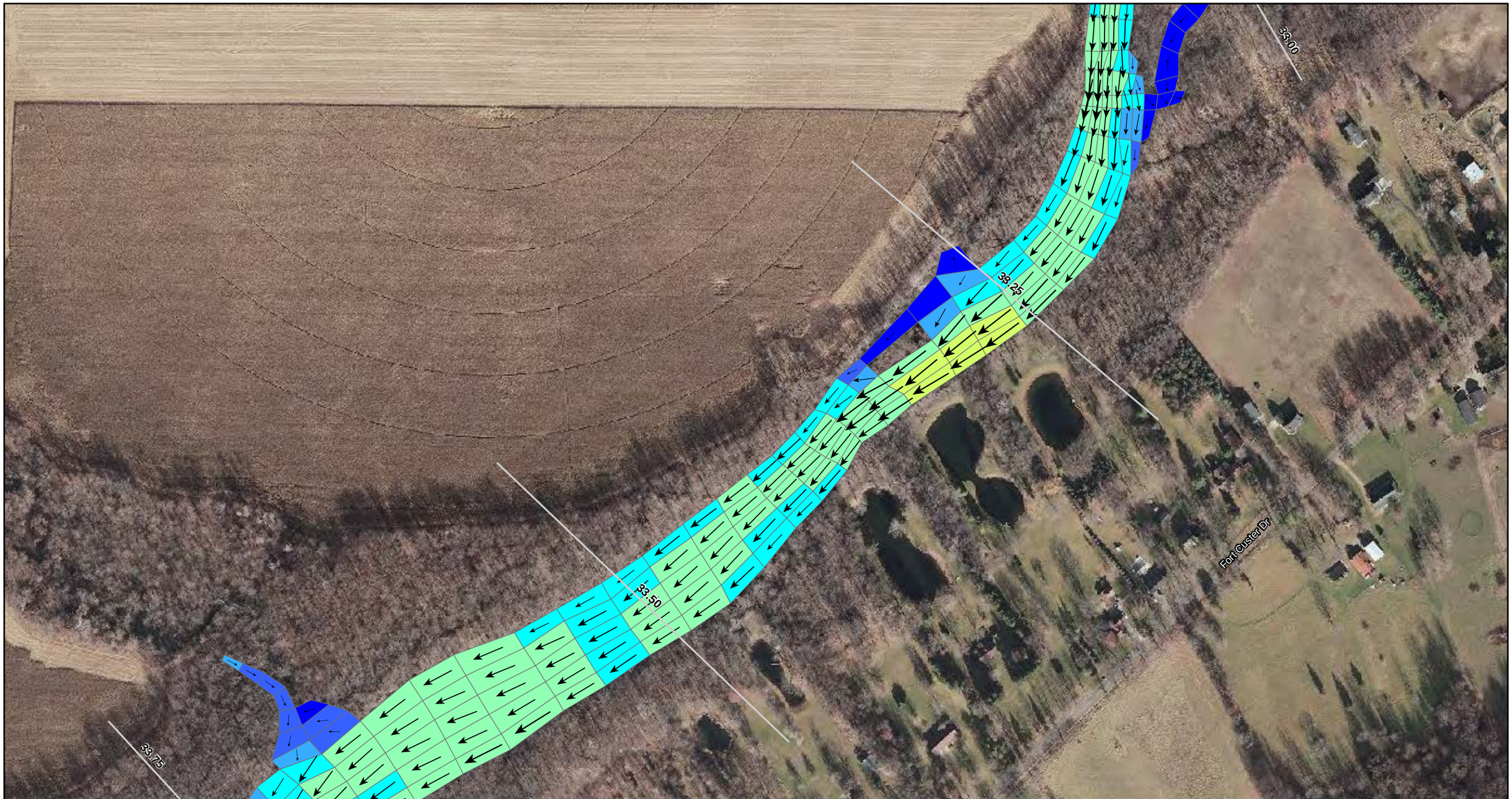
MP 32.25 - MP 33.10

SHEET 43 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep8_2010.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

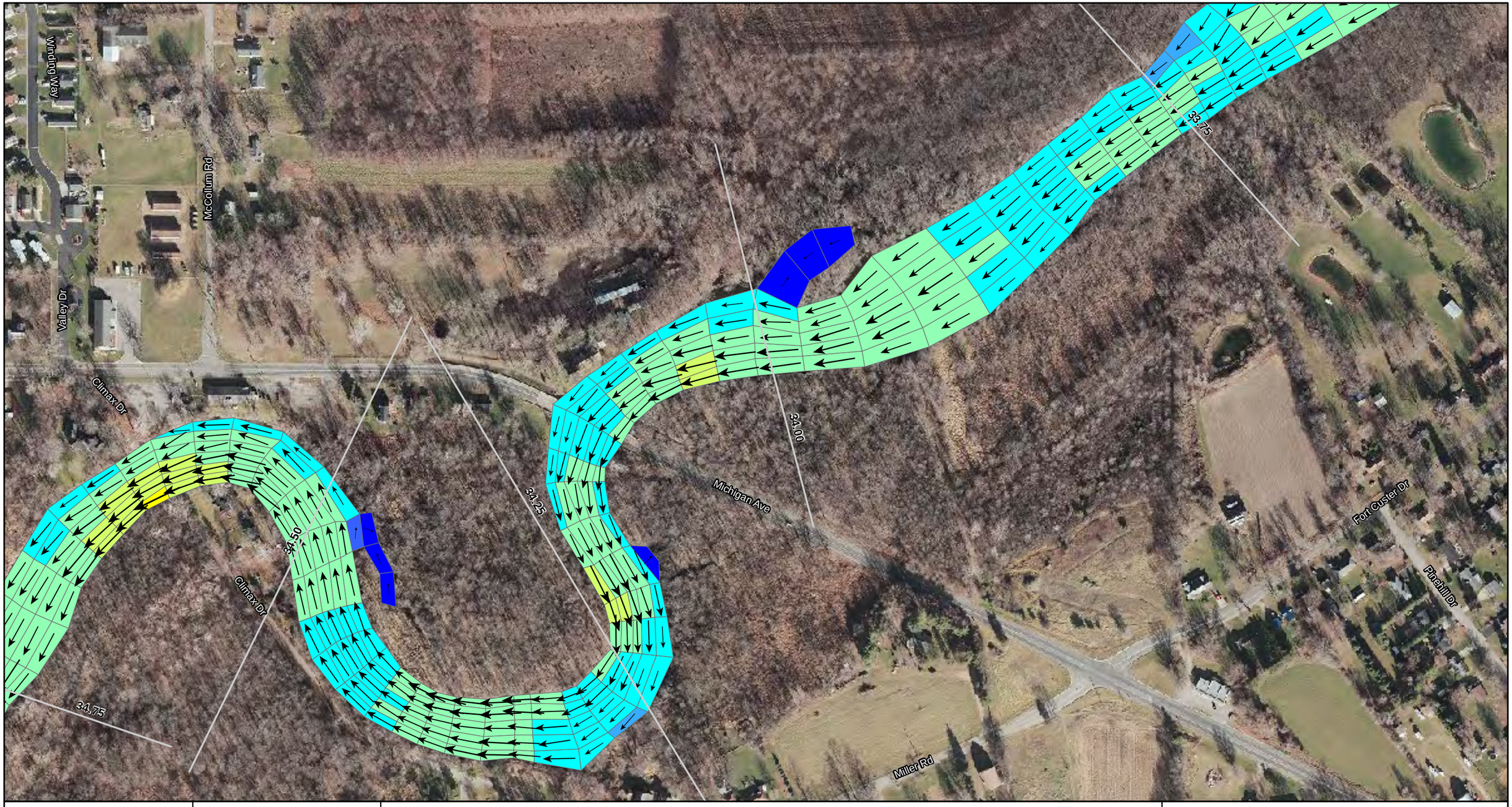
MP 33.10 - MP 33.70

SHEET 44 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep8_2010.mxd

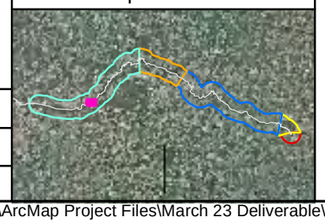
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

MP 33.70 - MP 34.70

SHEET 45 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep8_2010.mxd

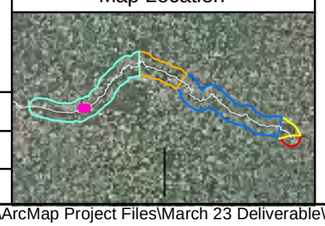
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

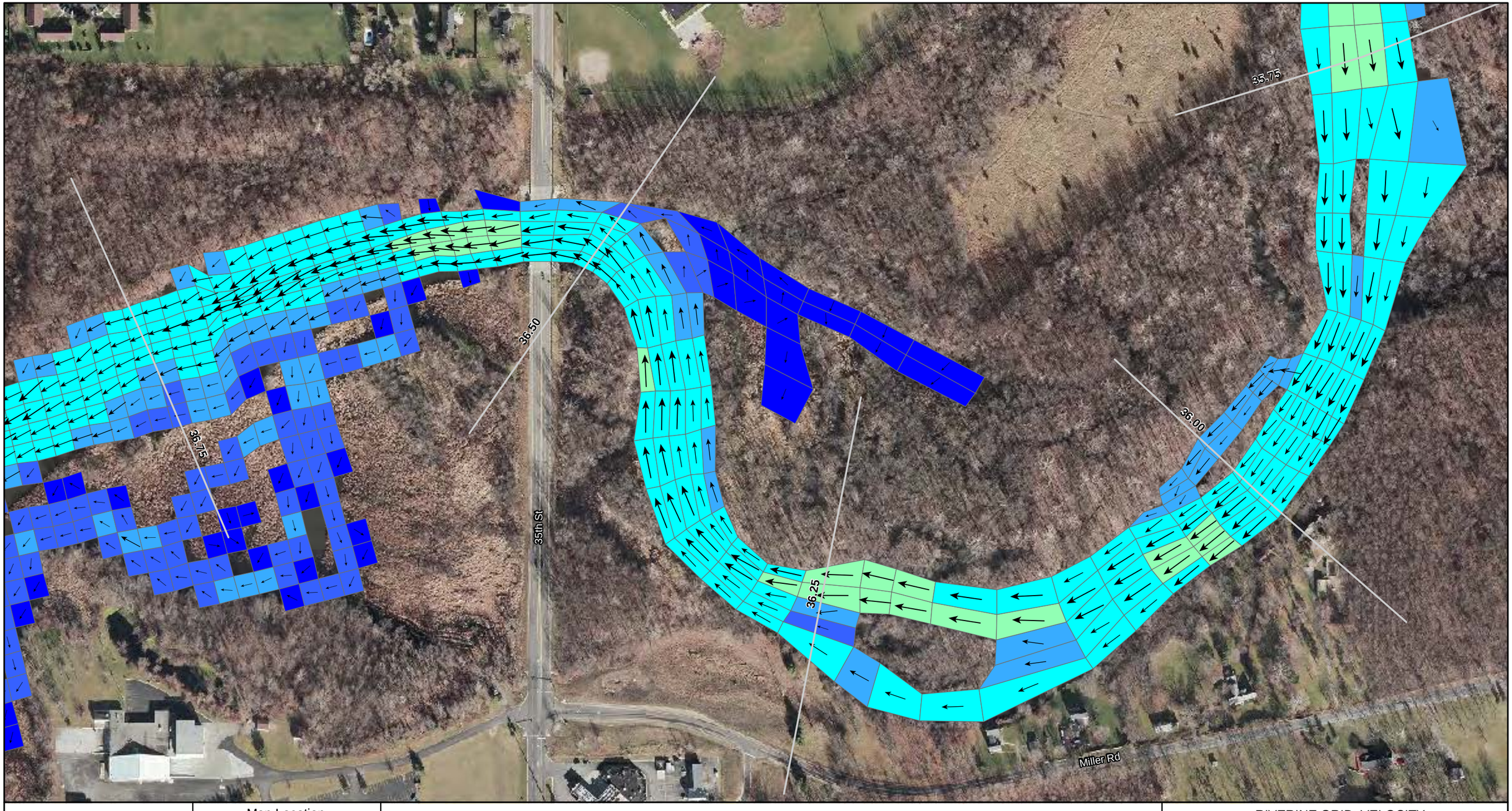
MP 34.70 - MP 35.75

SHEET 46 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep8_2010.mxd

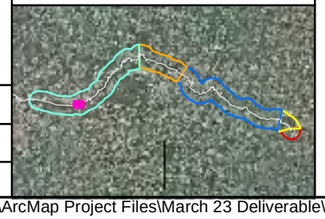
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

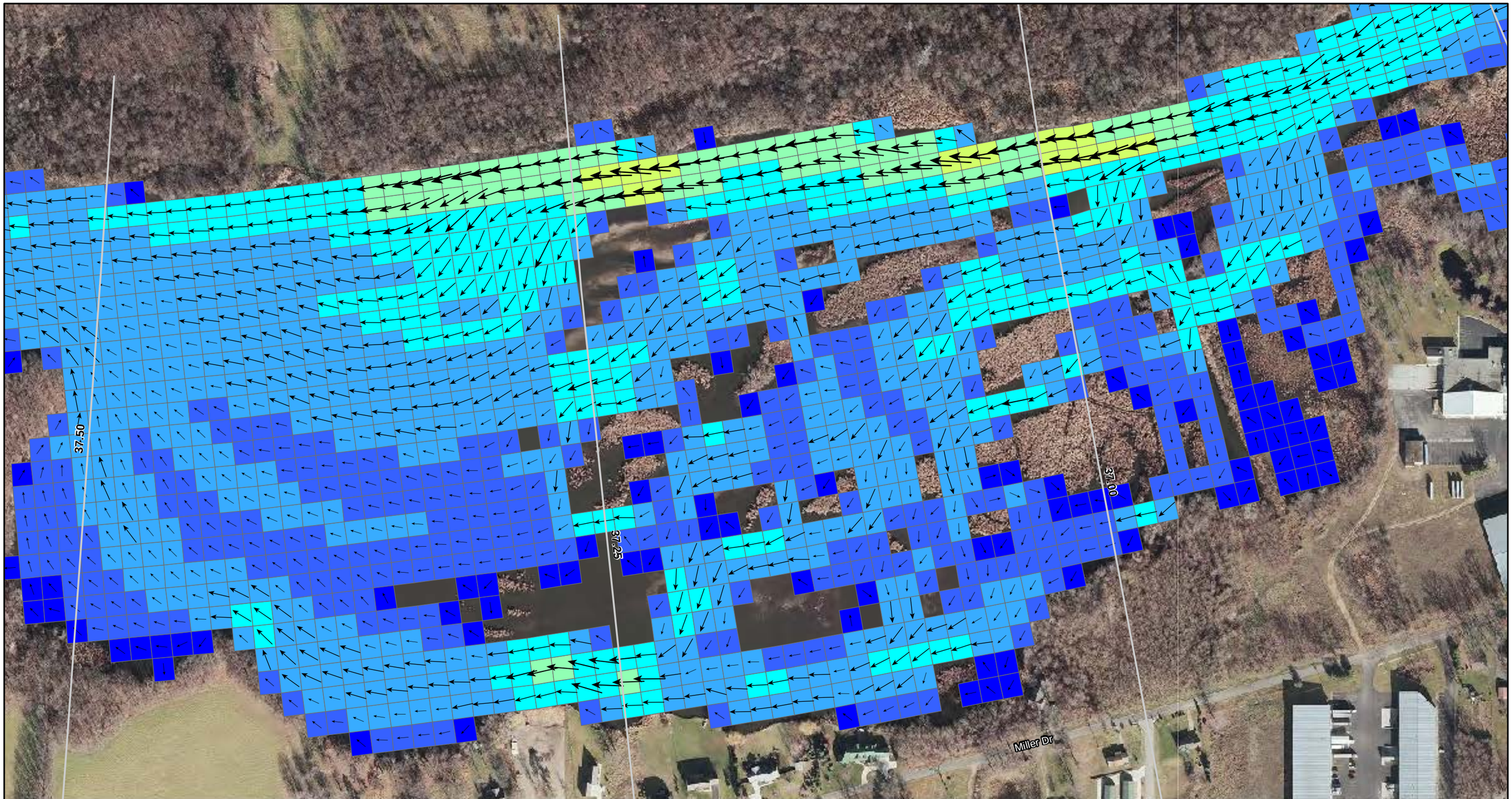
MP 35.75 - MP 36.80

SHEET 47 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep8_2010.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

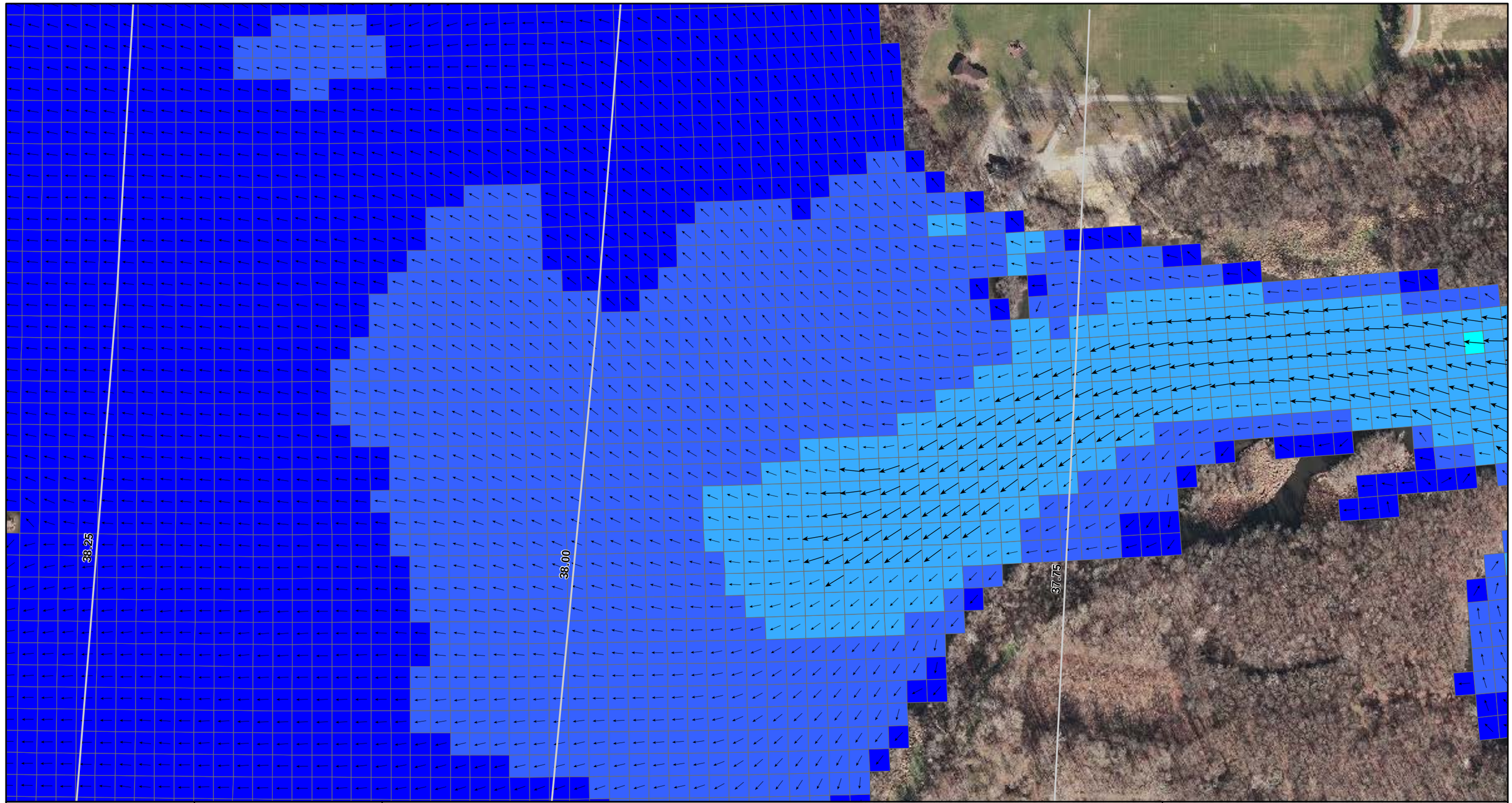
MP 36.80 - MP 37.55

SHEET 48 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep8_2010.mxd

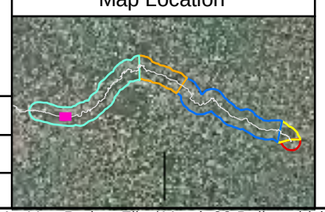
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

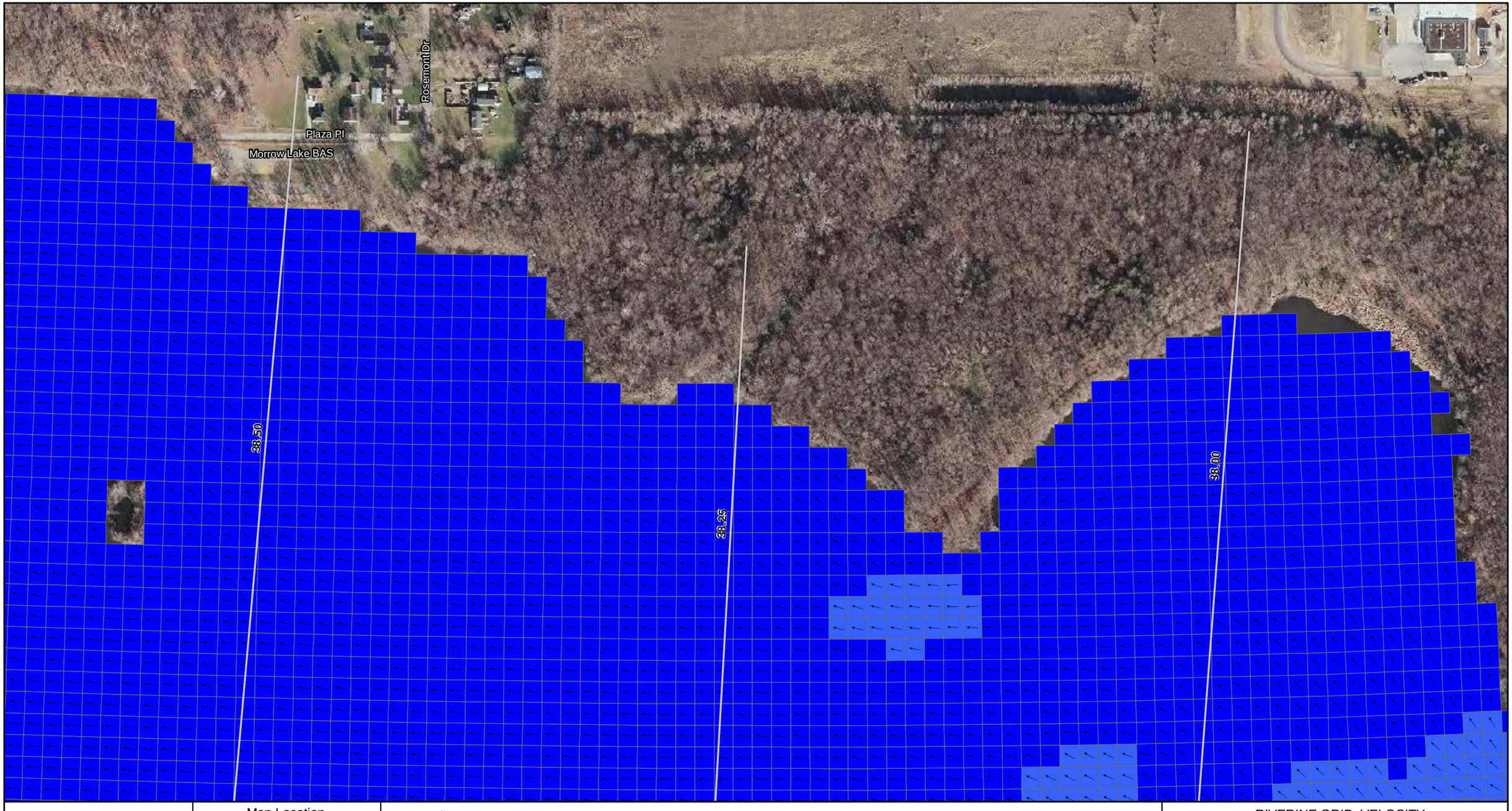
MP 37.55 - MP 38.30

SHEET 49 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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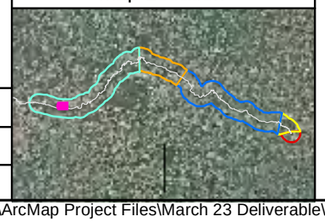
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

MP 37.80 - MP 38.60N

SHEET 50 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

38.50

38.25

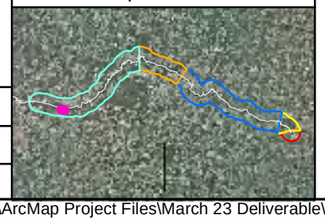
38.00

Lyth Rd

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

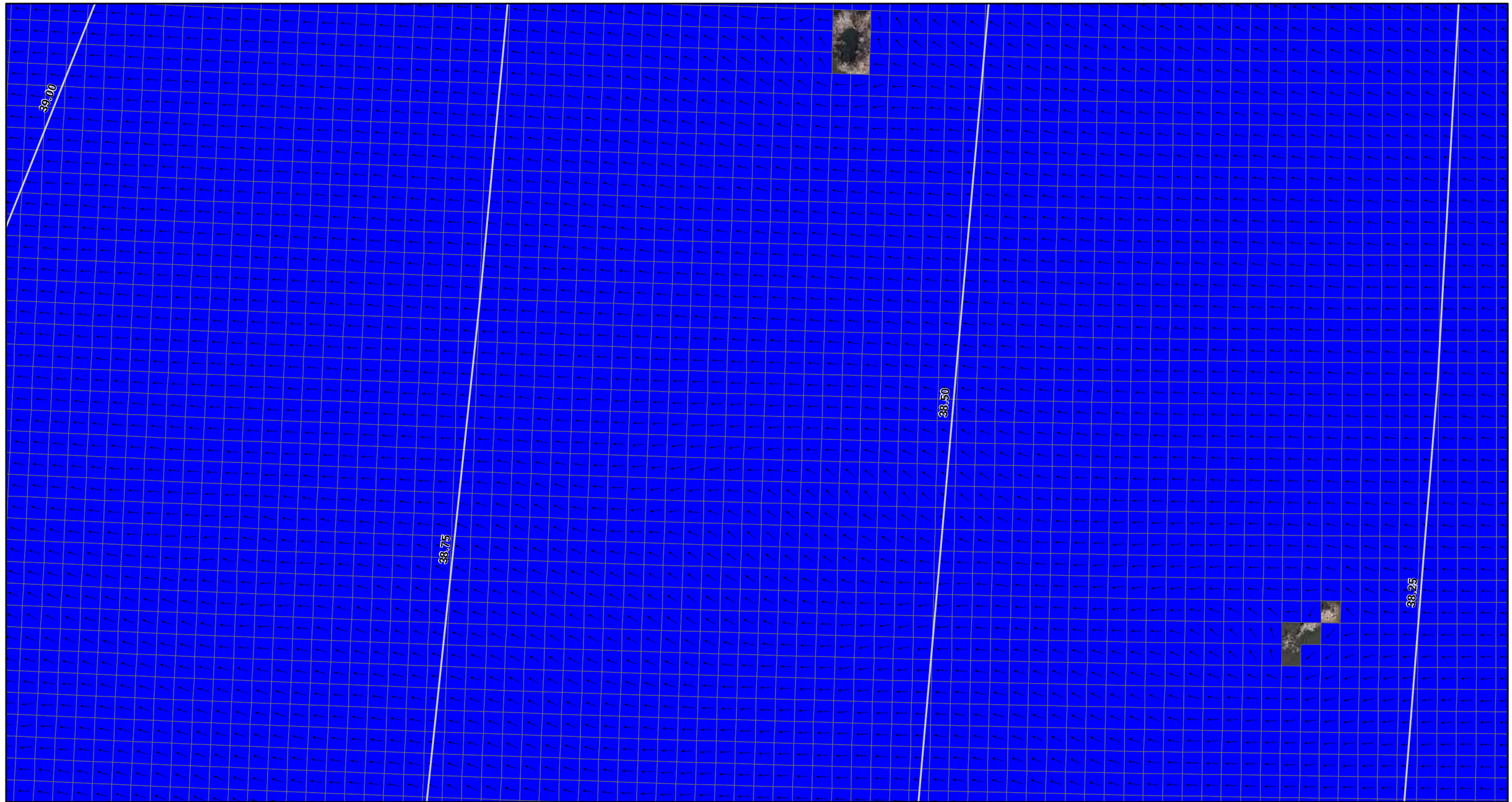
MP 37.80 - MP 38.60S

SHEET 51 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep8_2010.mxd

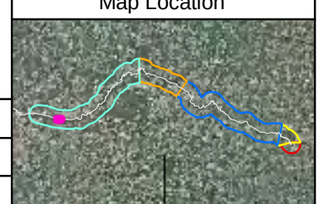
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

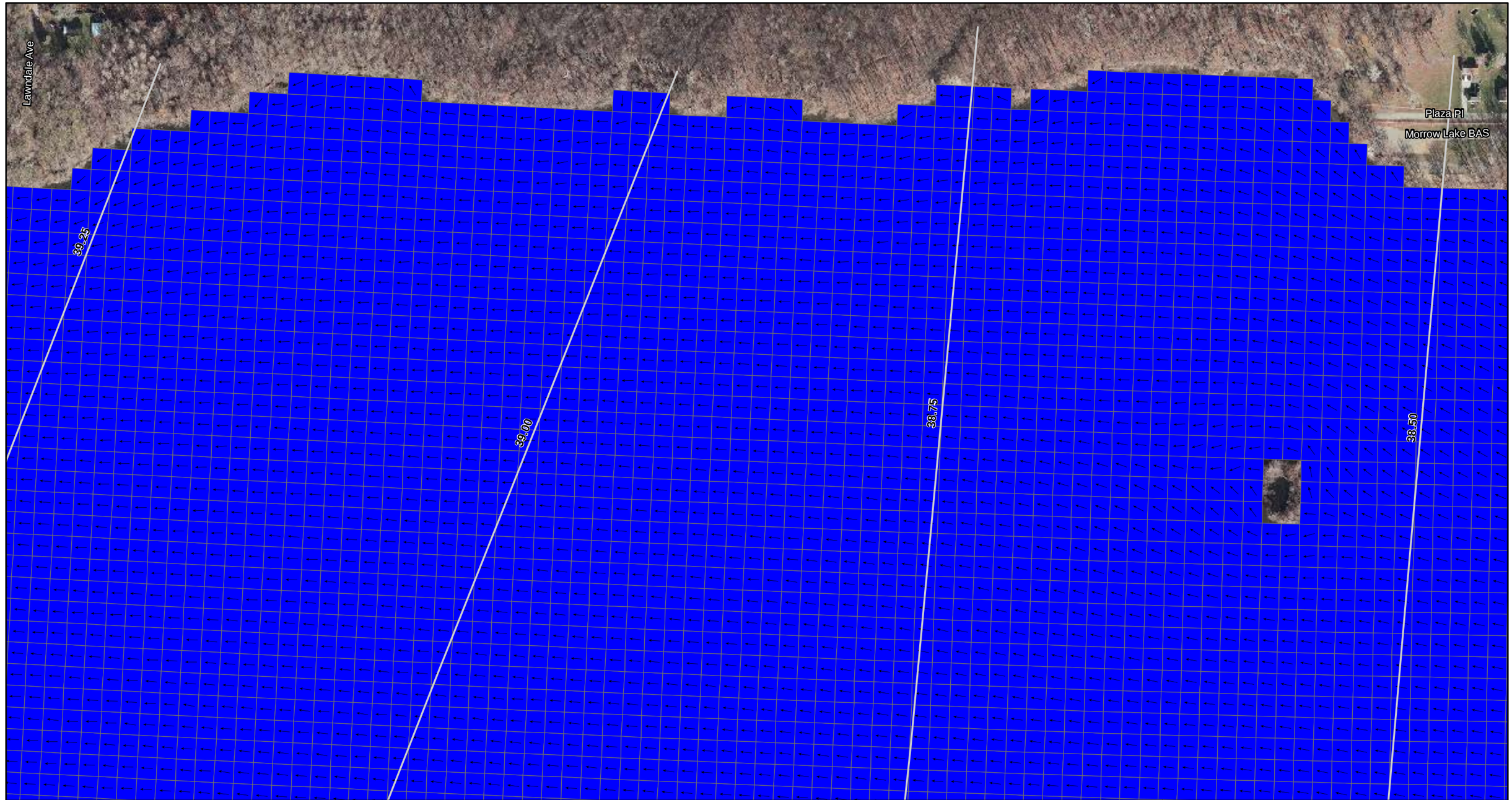
MP 38.25 - MP 39.00C

SHEET 52 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

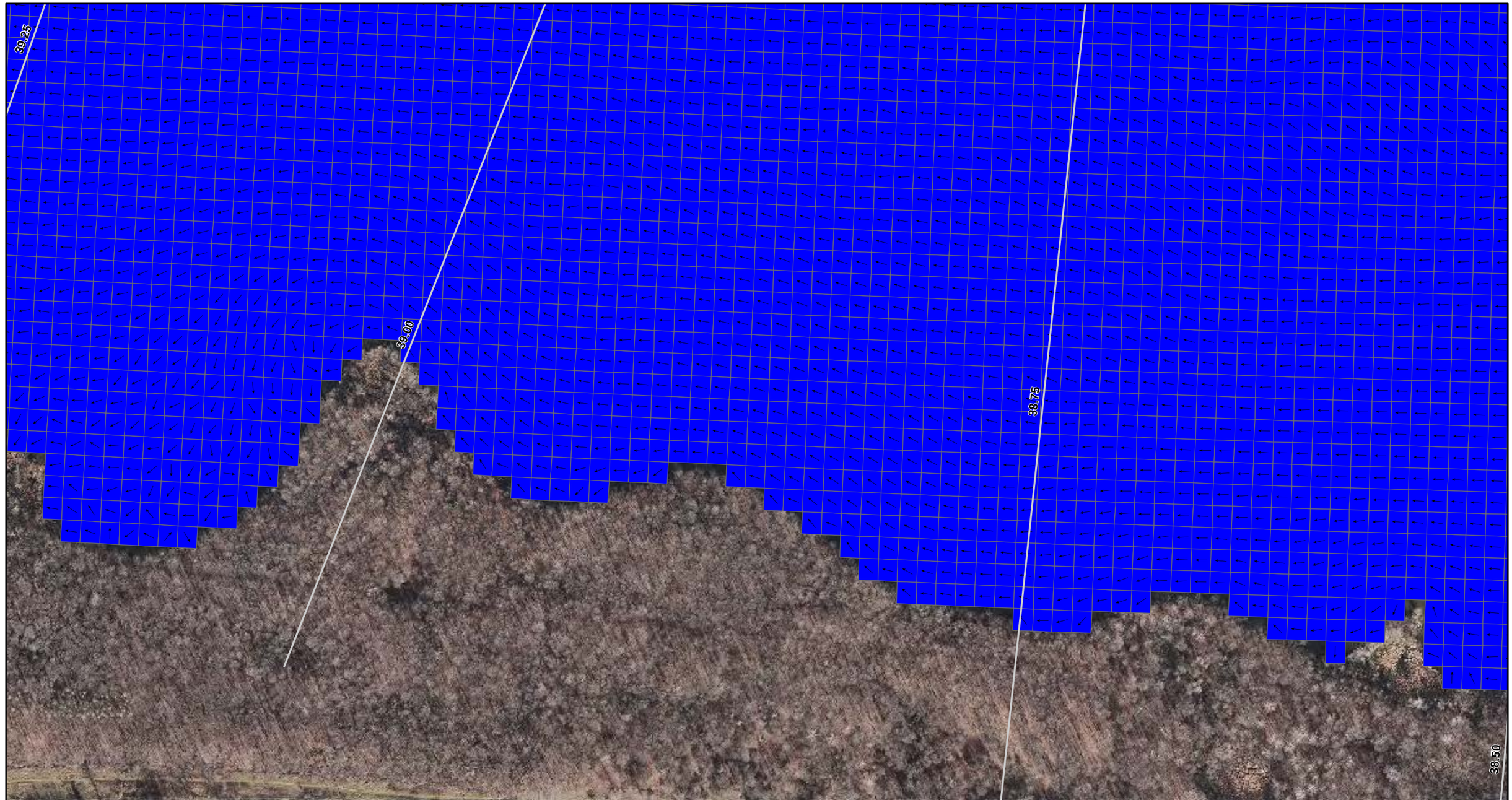
MP 38.50 - MP 39.25N

SHEET 53 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep8_2010.mxd

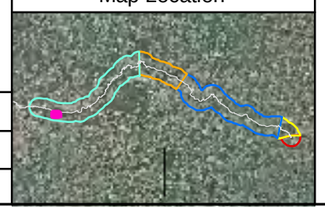
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

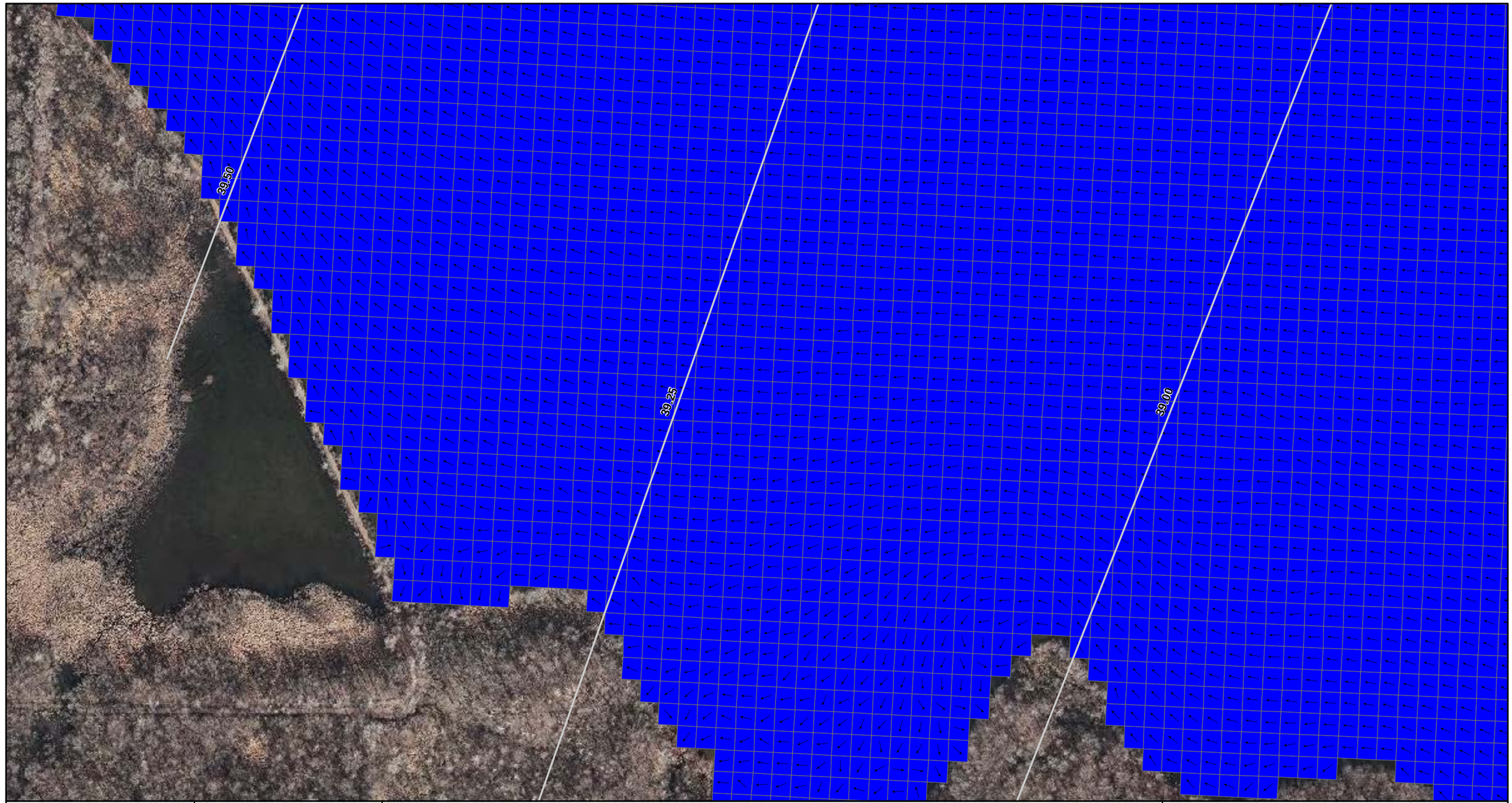
MP 38.50 - MP 39.25S

SHEET 54 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep8_2010.mxd

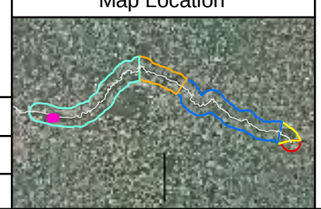
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

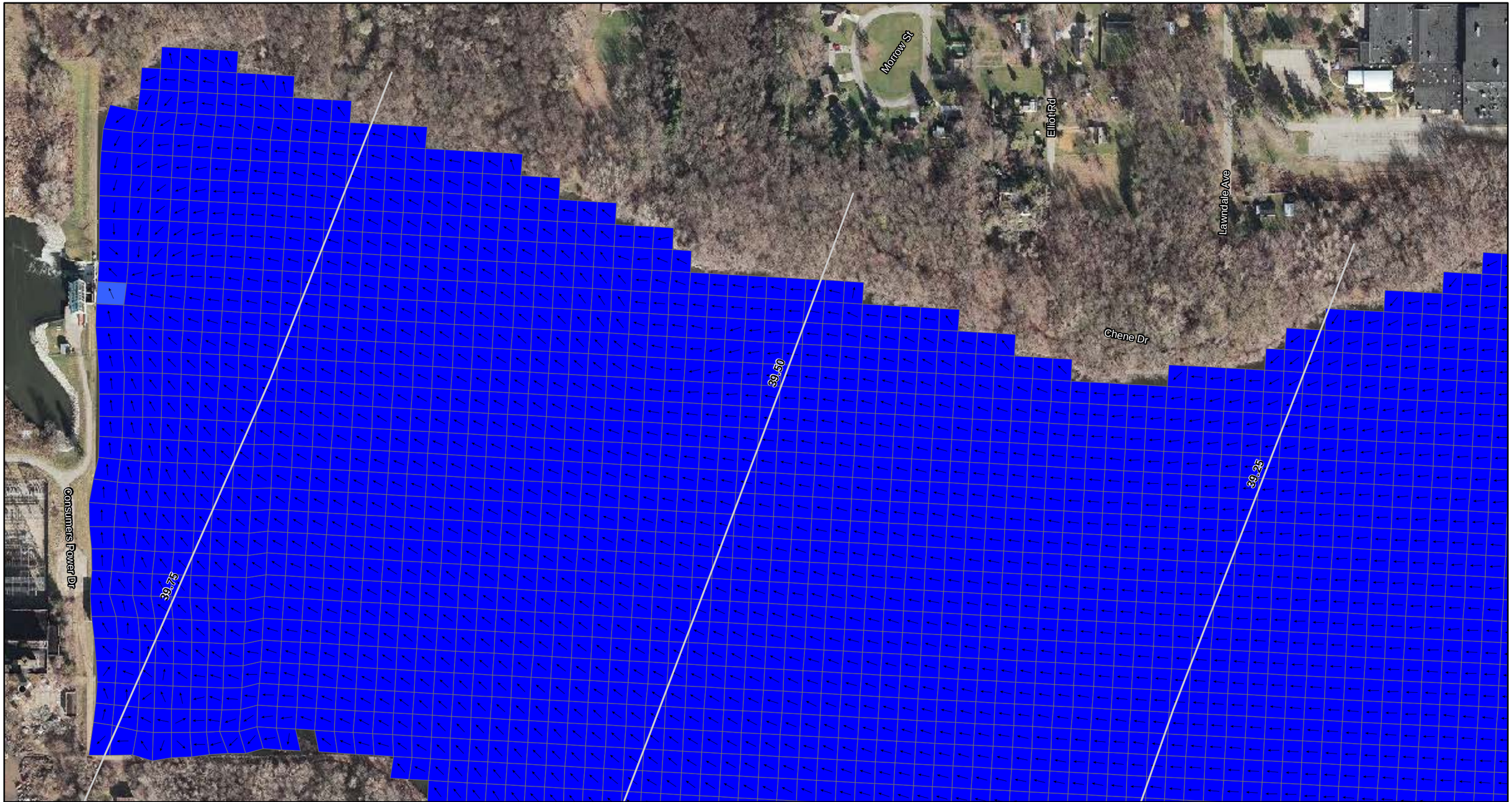
MP 38.90 - MP 39.60S

SHEET 55 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 8, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 8, 2010

MP 39.15 - MP 39.85

SHEET 56 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep8_2010.mxd

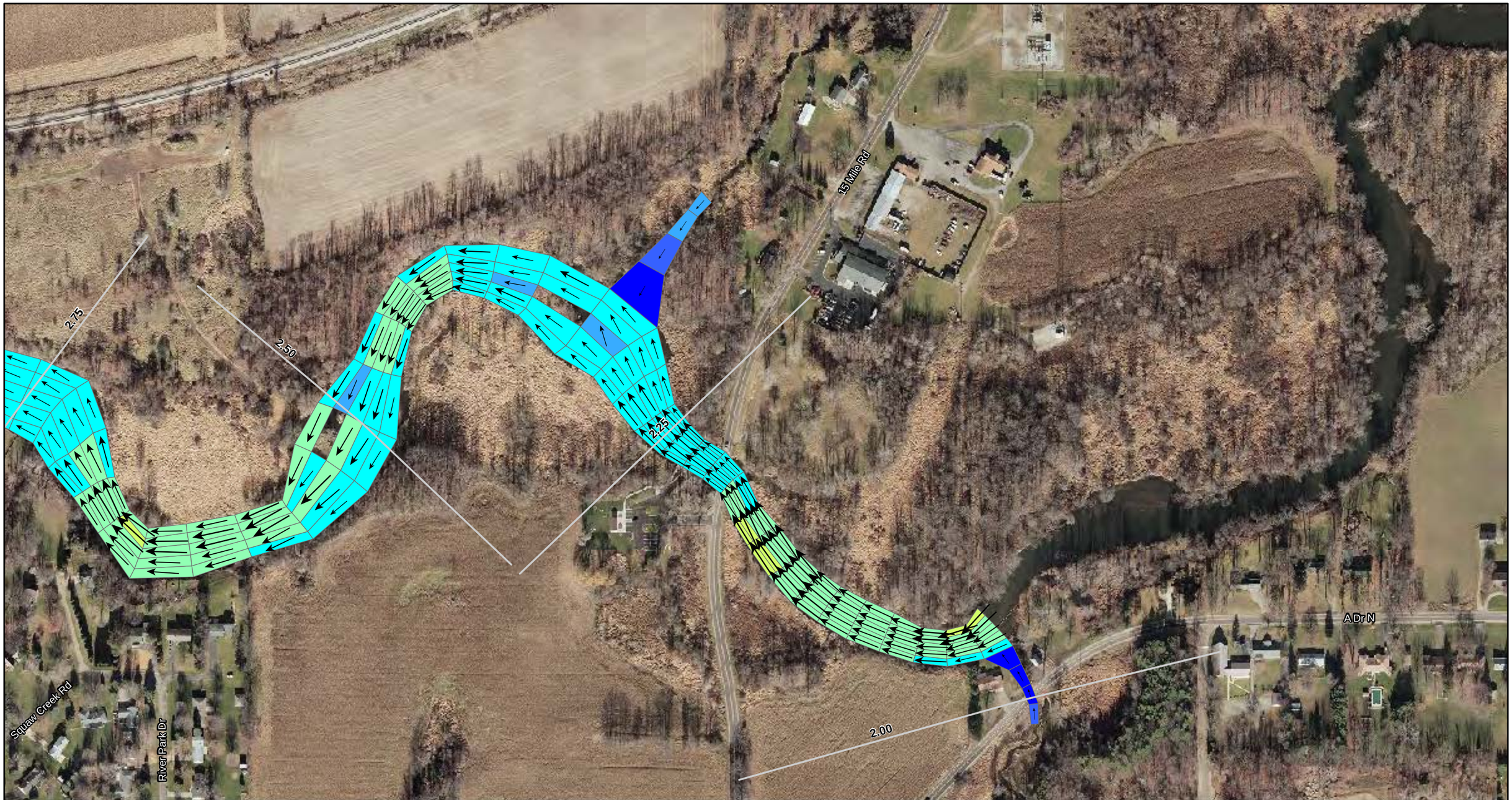
Aerial Photography Date: November 2011

Figure 6-4

Riverine Grid: Velocity

September 9, 2010

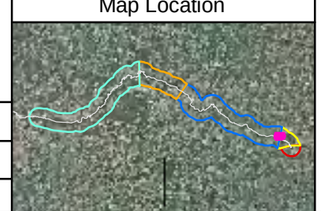
Sheets 1 through 56



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

MP 01.95 - MP 02.75

SHEET 1 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep9_2010.mxd

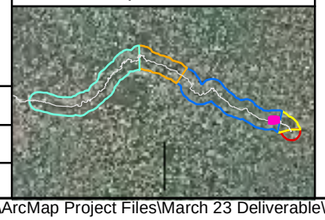
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

MP 02.60 - MP 03.40

SHEET 2 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep9_2010.mxd

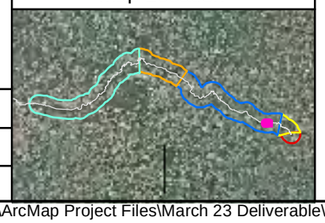
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

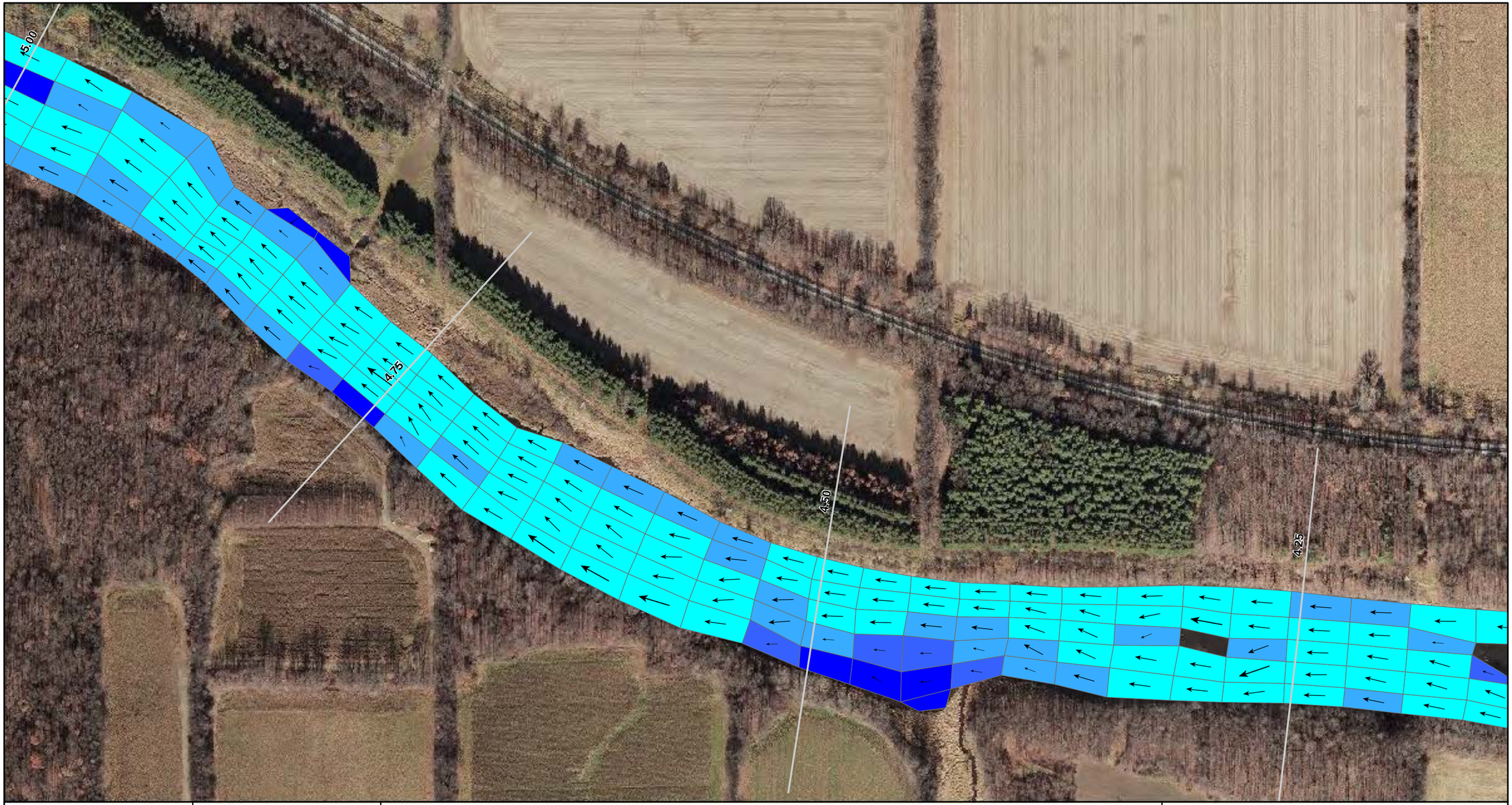
MP 03.40 - MP 04.20

SHEET 3 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep9_2010.mxd

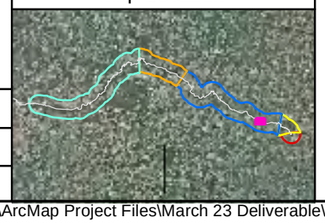
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

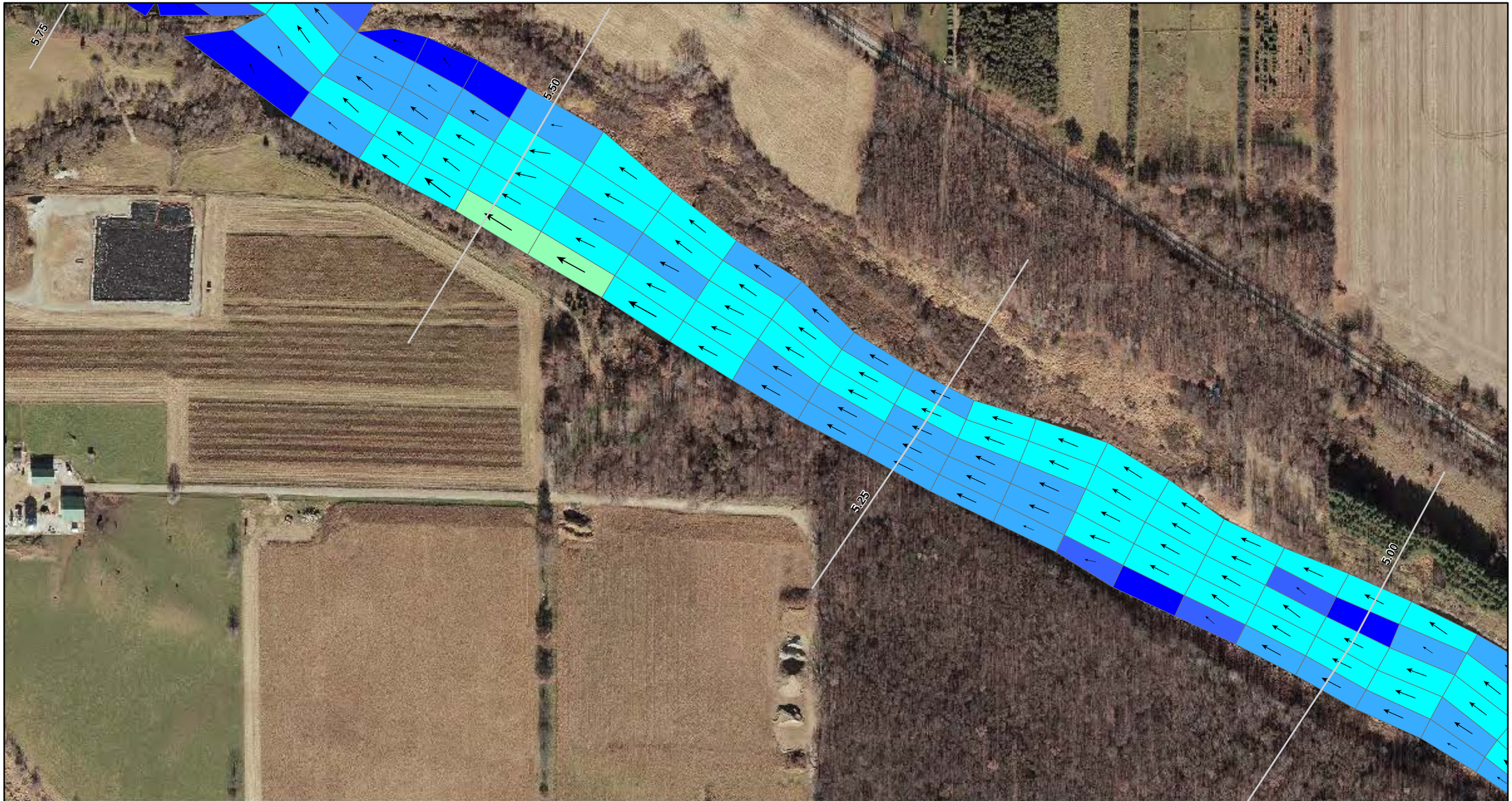
MP 04.15 - MP 05.00

SHEET 4 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep9_2010.mxd

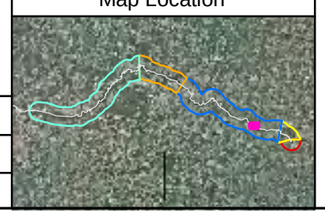
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
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- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

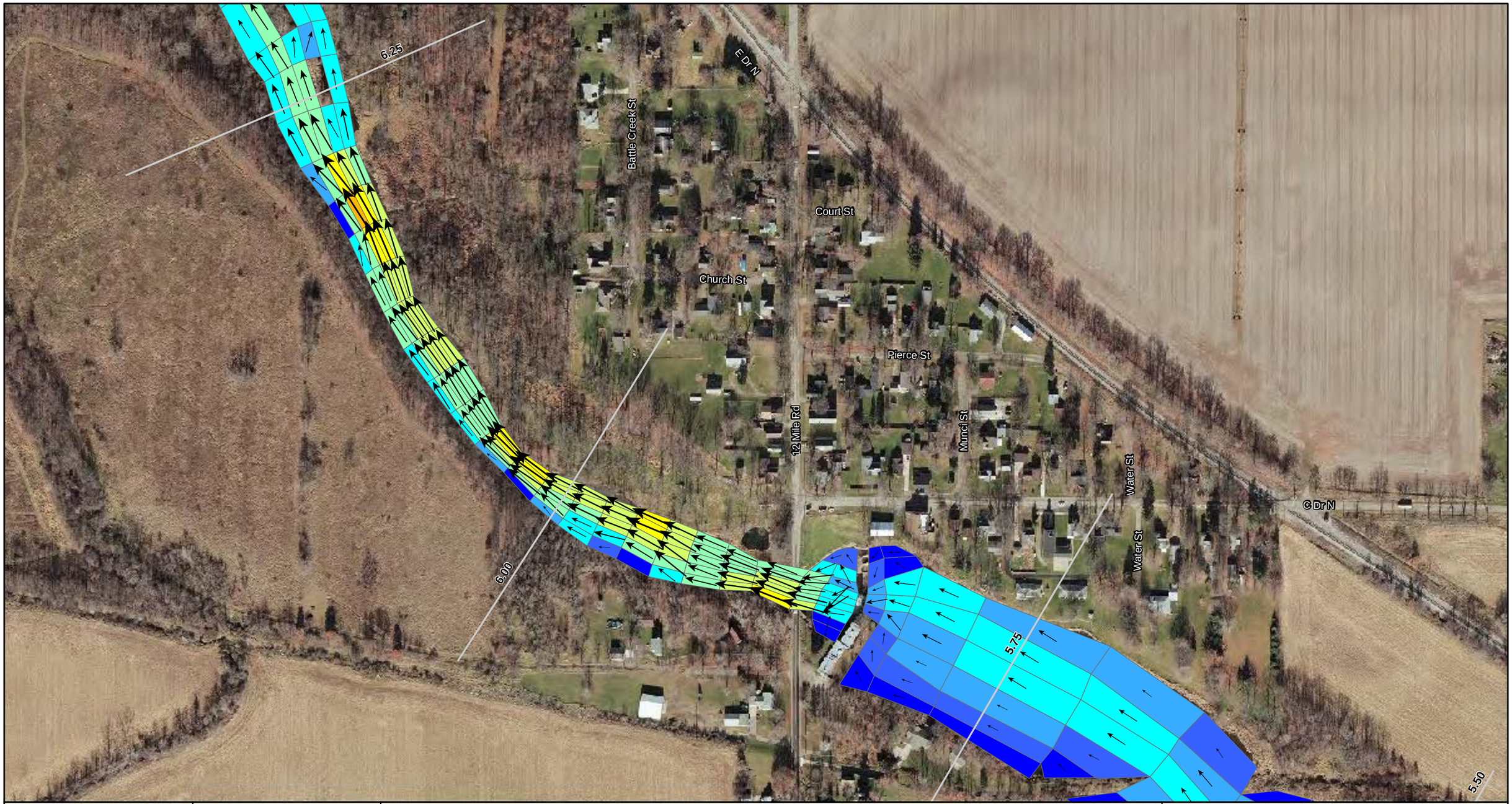
MP 04.90 - MP 05.65

SHEET 5 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep9_2010.mxd

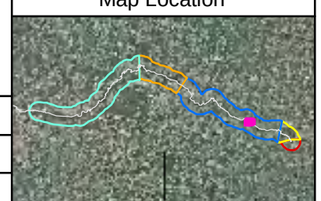
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
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- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

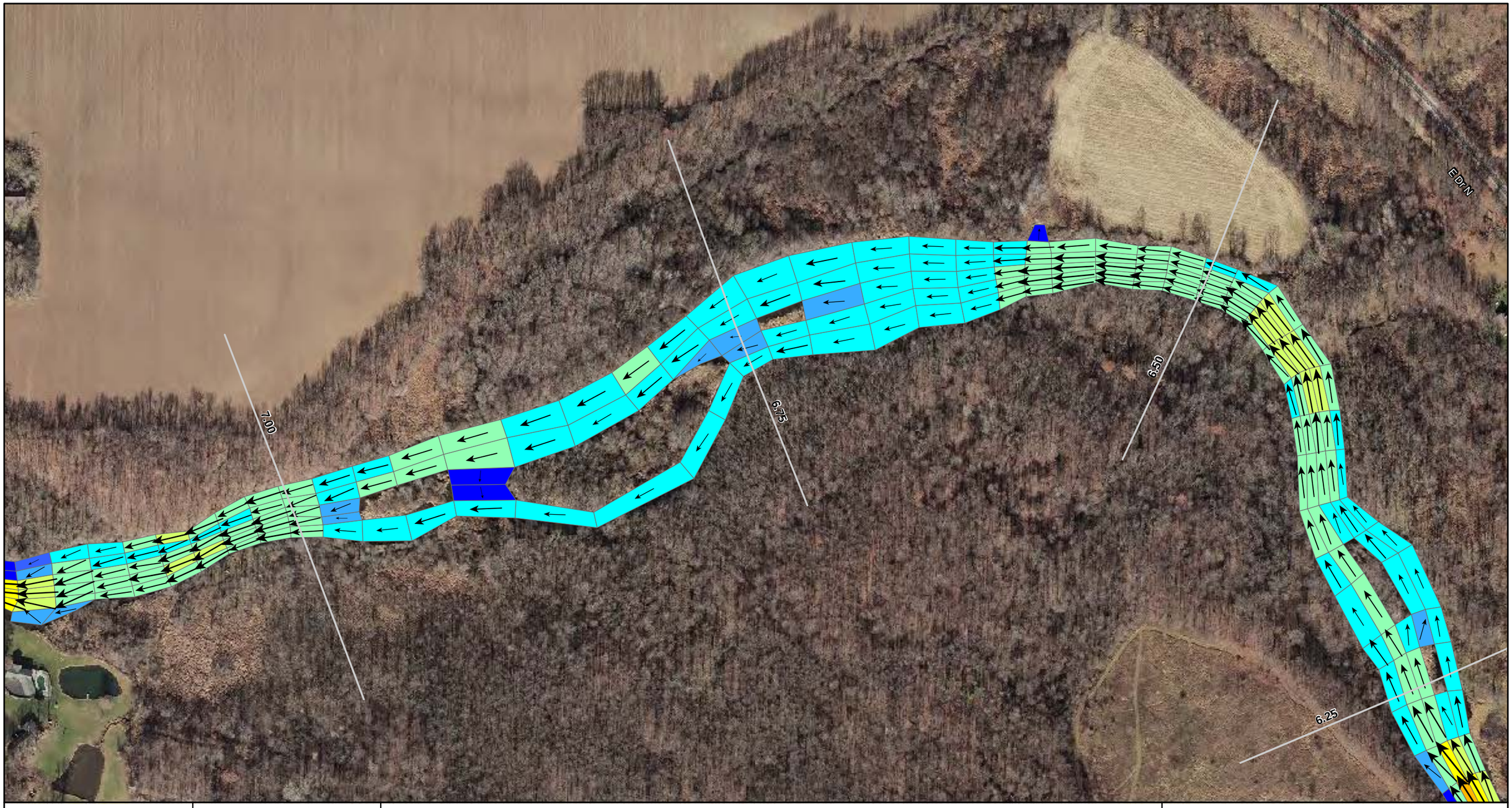
MP 05.65 - MP 06.30

SHEET 6 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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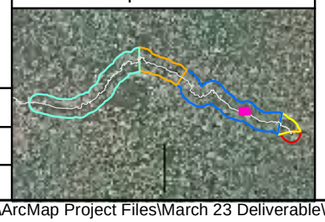
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
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- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

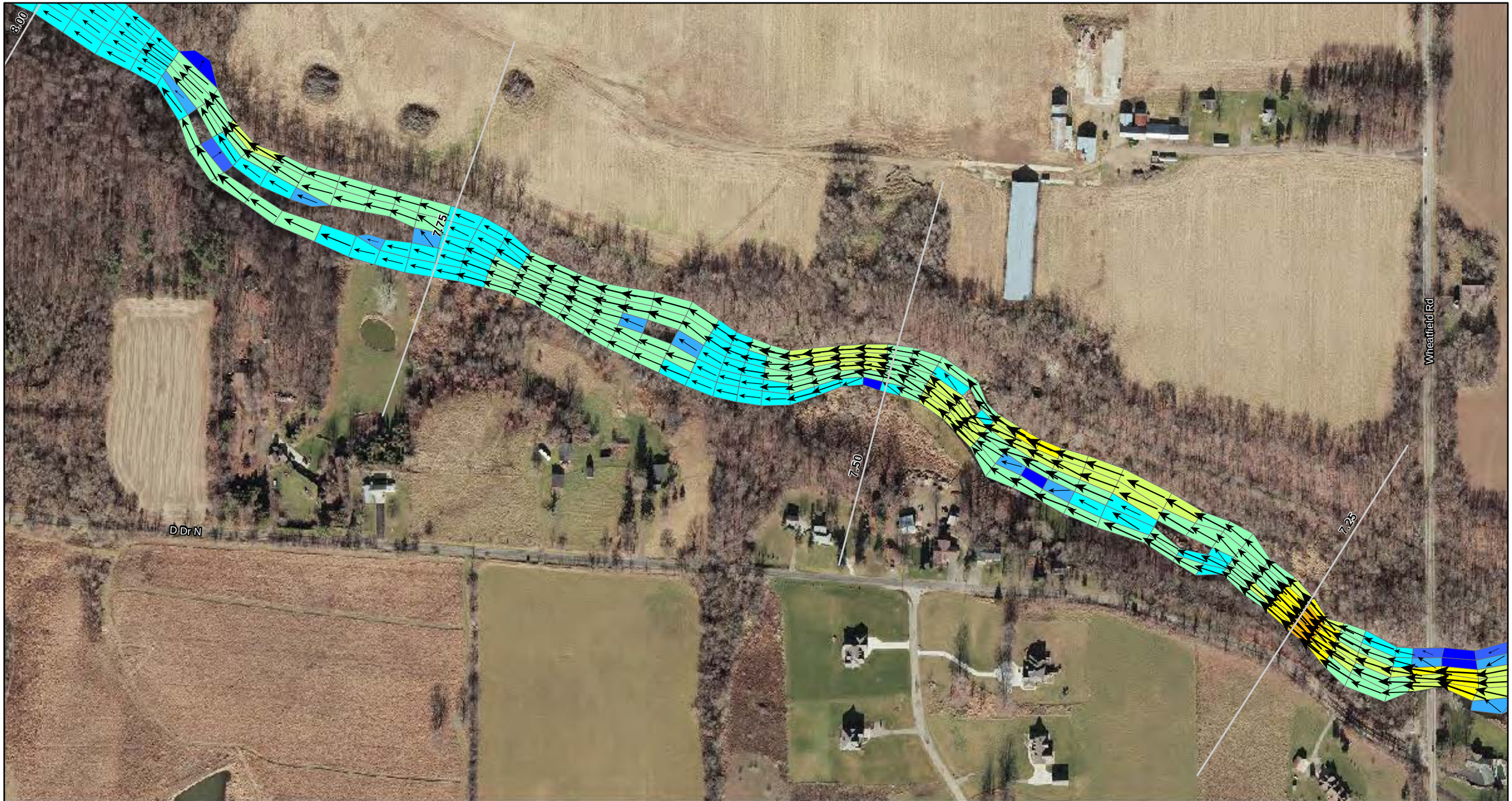
MP 06.20 - MP 07.15

SHEET 7 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
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- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

MP 07.15 - MP 07.95

SHEET 8 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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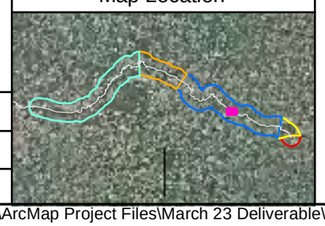
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
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- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

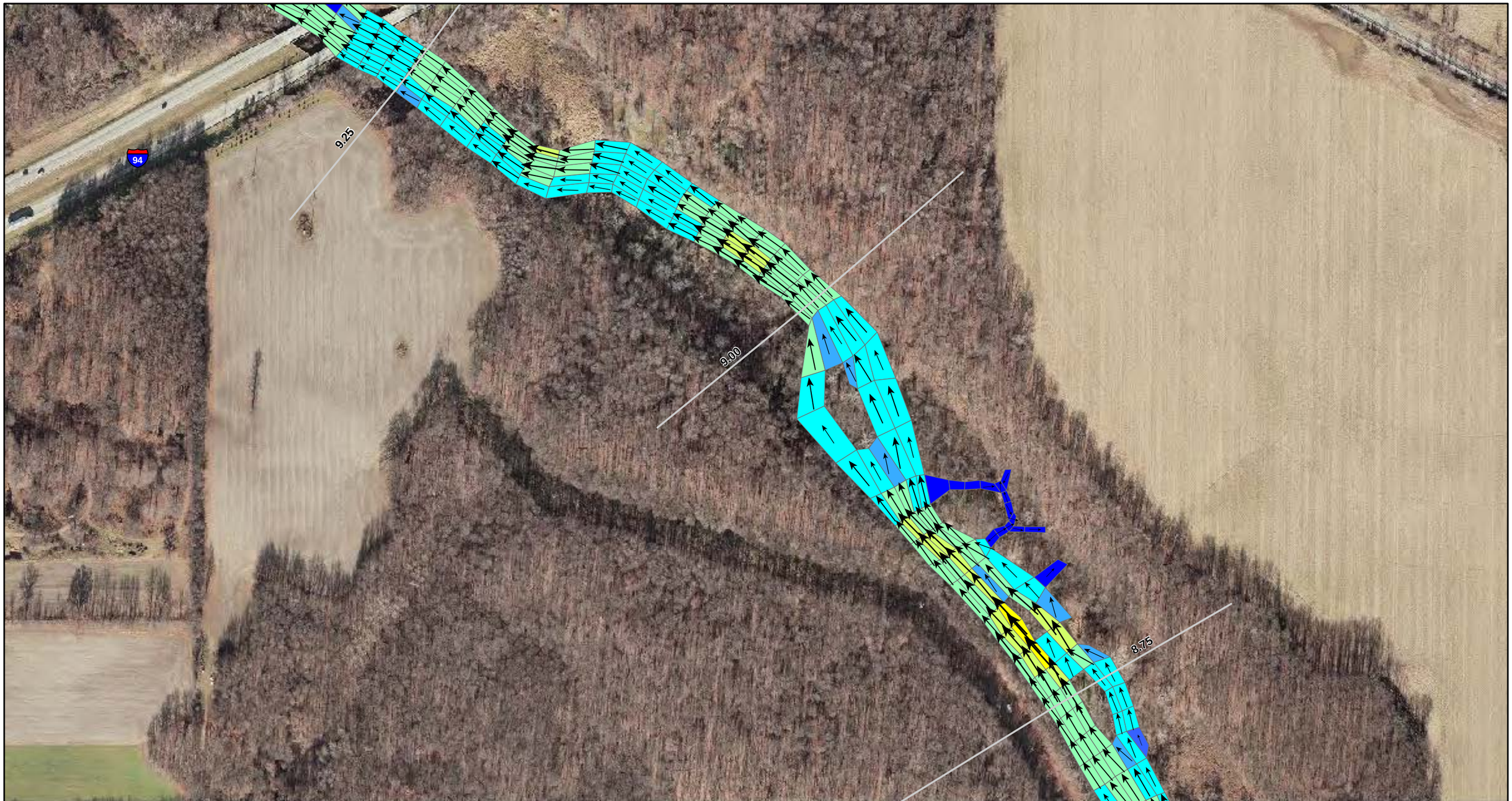
MP 07.90 - MP 08.75

SHEET 9 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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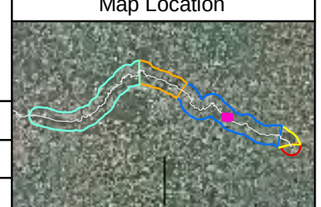
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

MP 08.70 - MP 09.30

SHEET 10 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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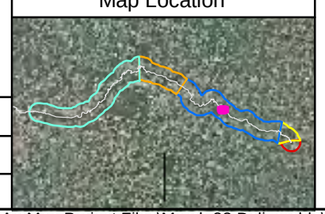
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
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- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

MP 09.25 - MP 10.05

SHEET 11 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

10.50

10.25

10.00

River Rd E

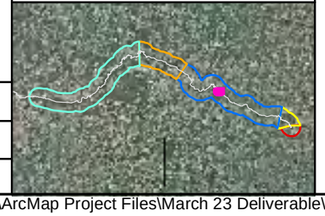
Golden Ave

G Dr N

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
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- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
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- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

MP 10.00 - MP 10.65

SHEET 12 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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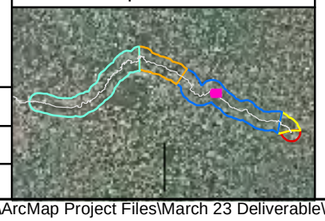
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
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← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

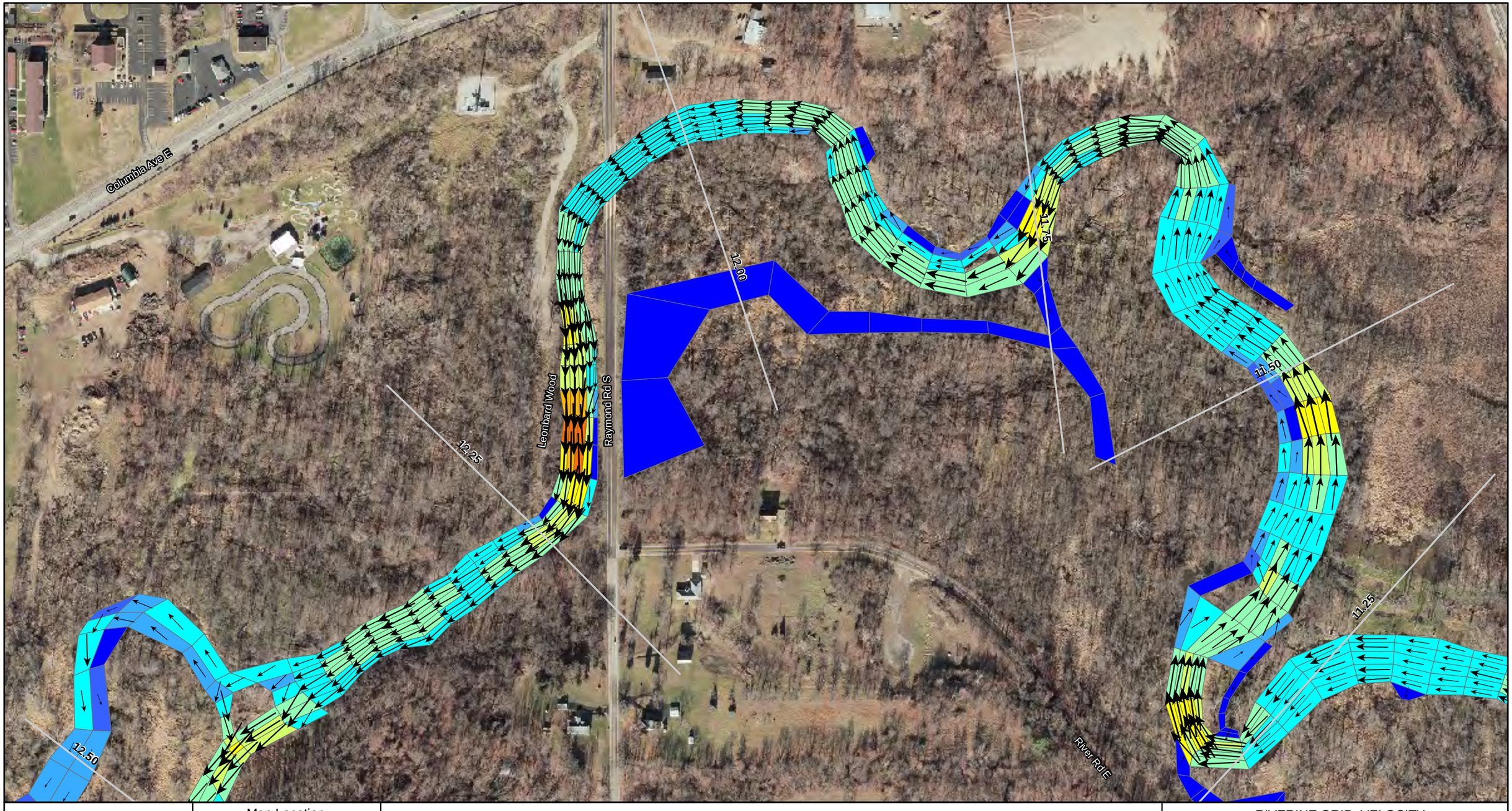
MP 10.60 - MP 11.40

SHEET 13 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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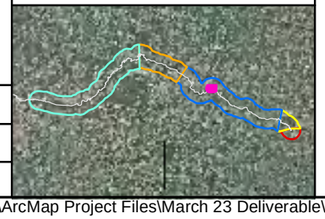
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

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← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

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Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

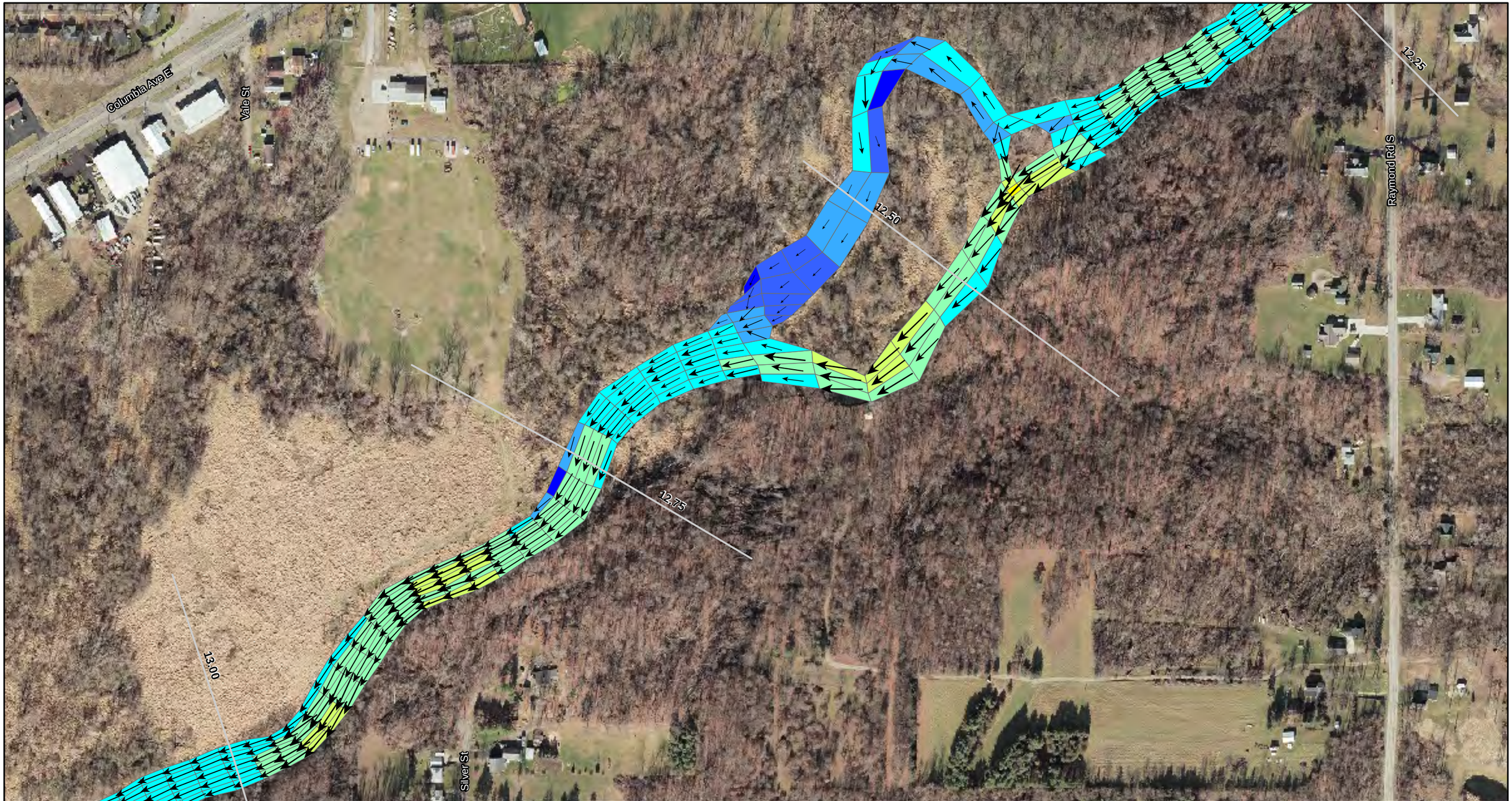
MP 11.10 - MP 12.45

SHEET 14 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep9_2010.mxd

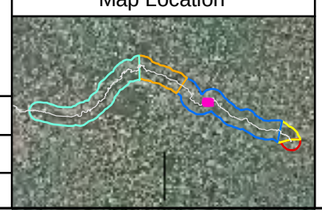
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
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- 0.25 - 0.5 ft/sec
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- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

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0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

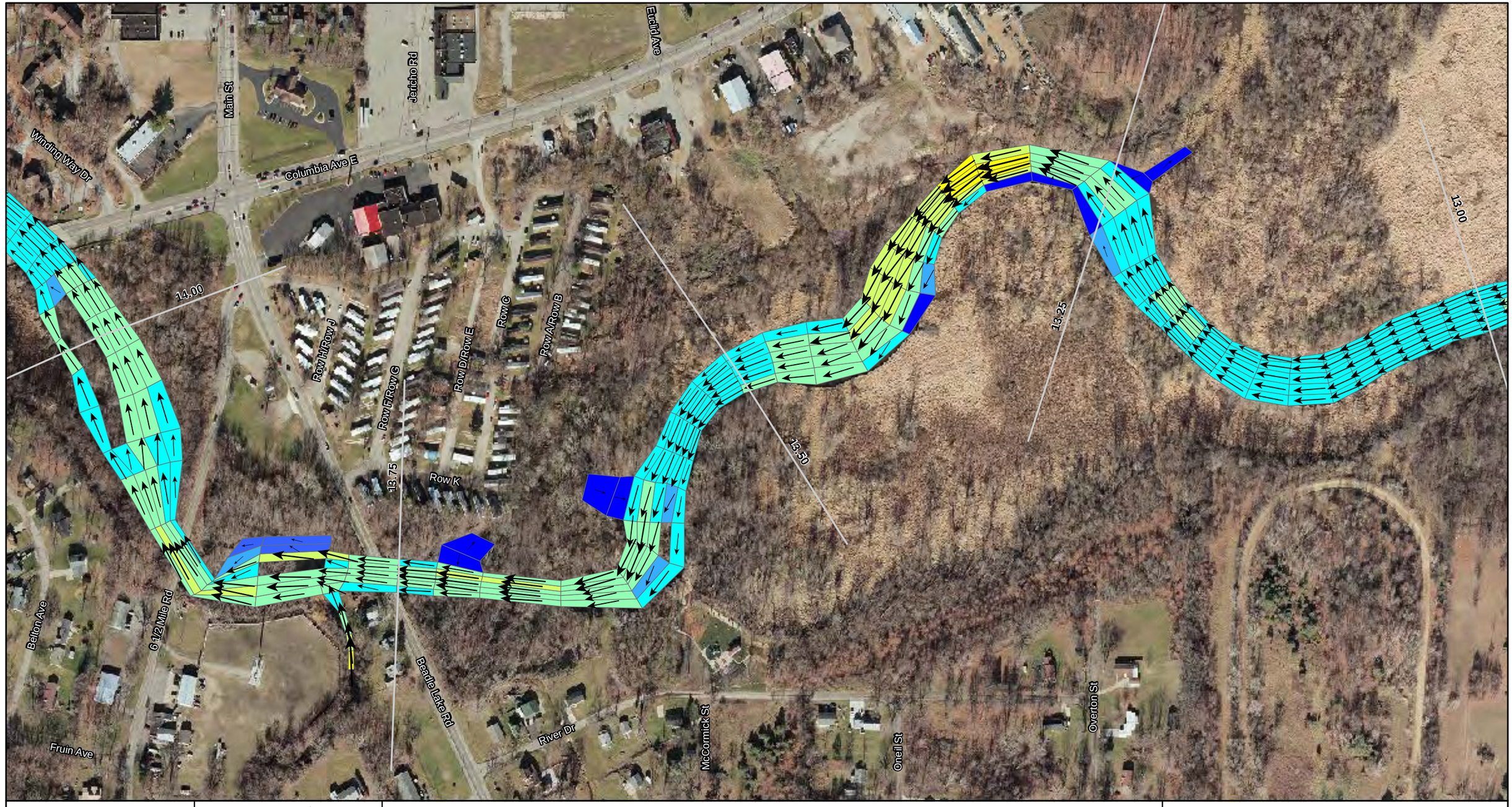
MP 12.30 - MP 13.05

SHEET 15 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep9_2010.mxd

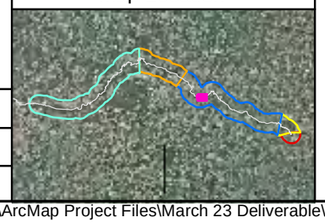
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

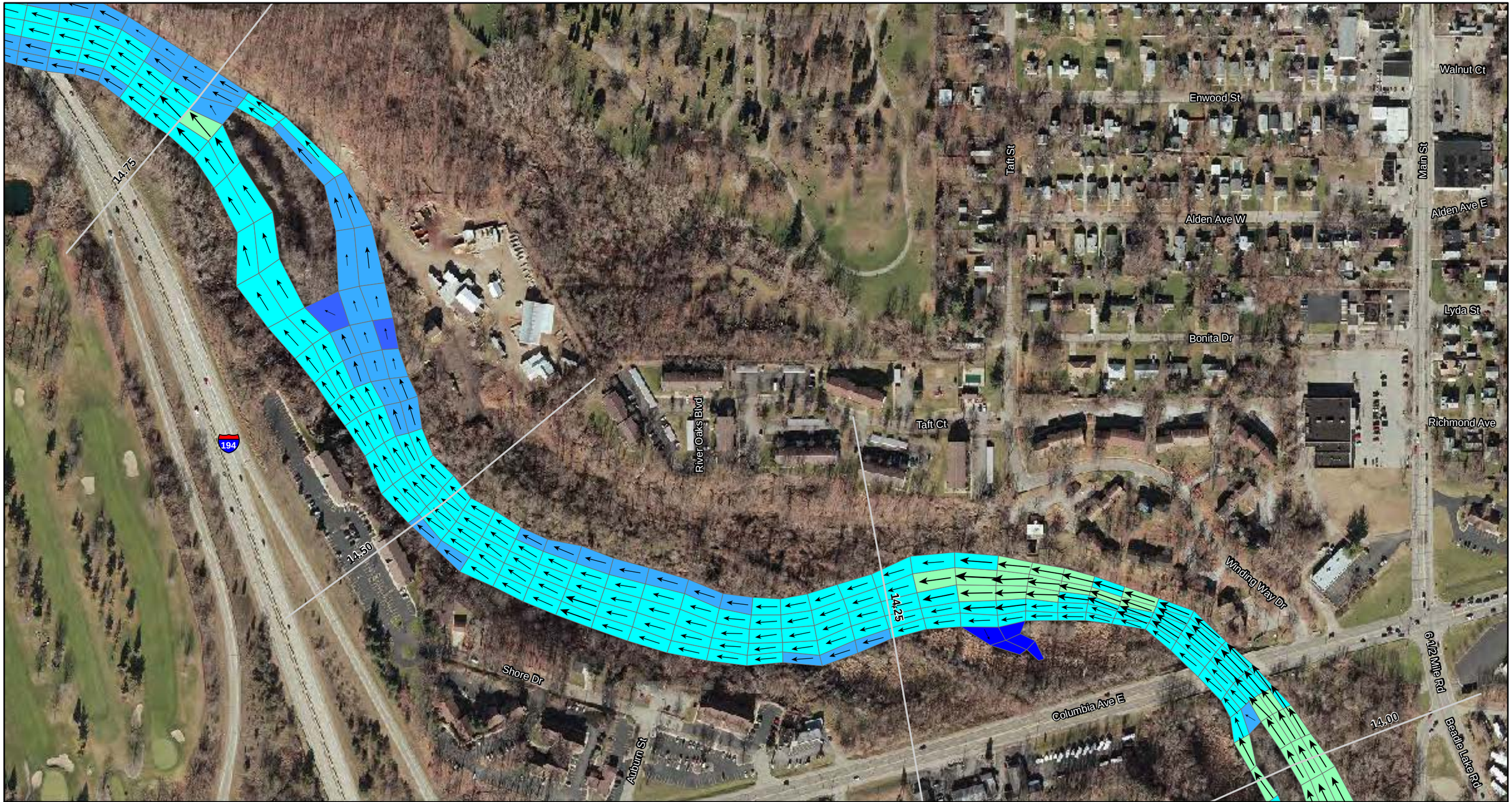
MP 13.00 - MP 14.10

SHEET 16 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep9_2010.mxd

Aerial Photography Date: November 2011



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

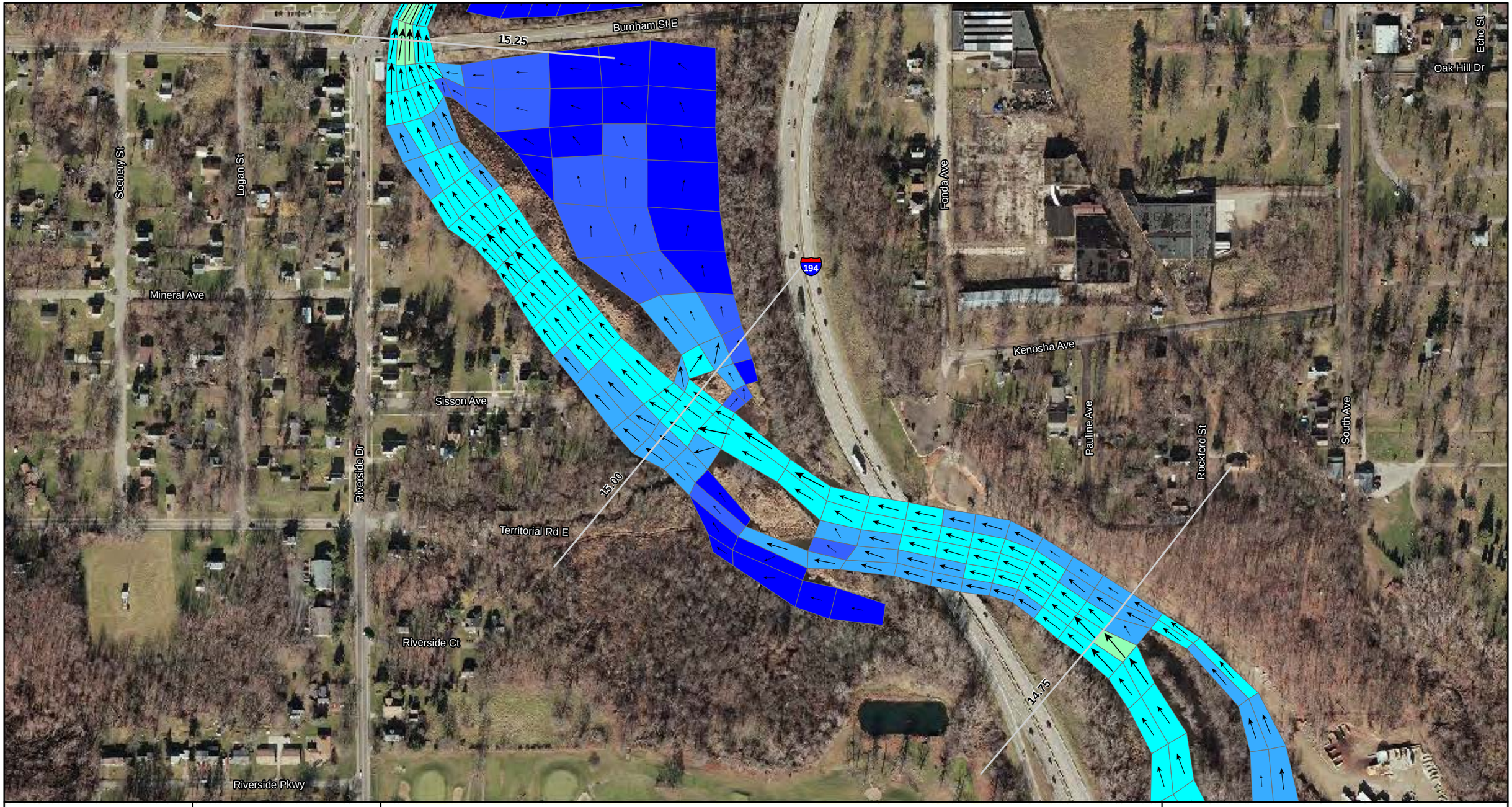
MP 14.00 - MP 14.85

SHEET 17 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

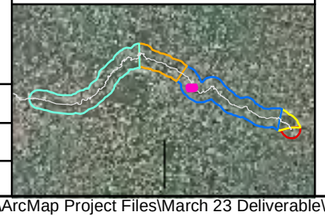
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep9_2010.mxd

Aerial Photography Date: November 2011



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

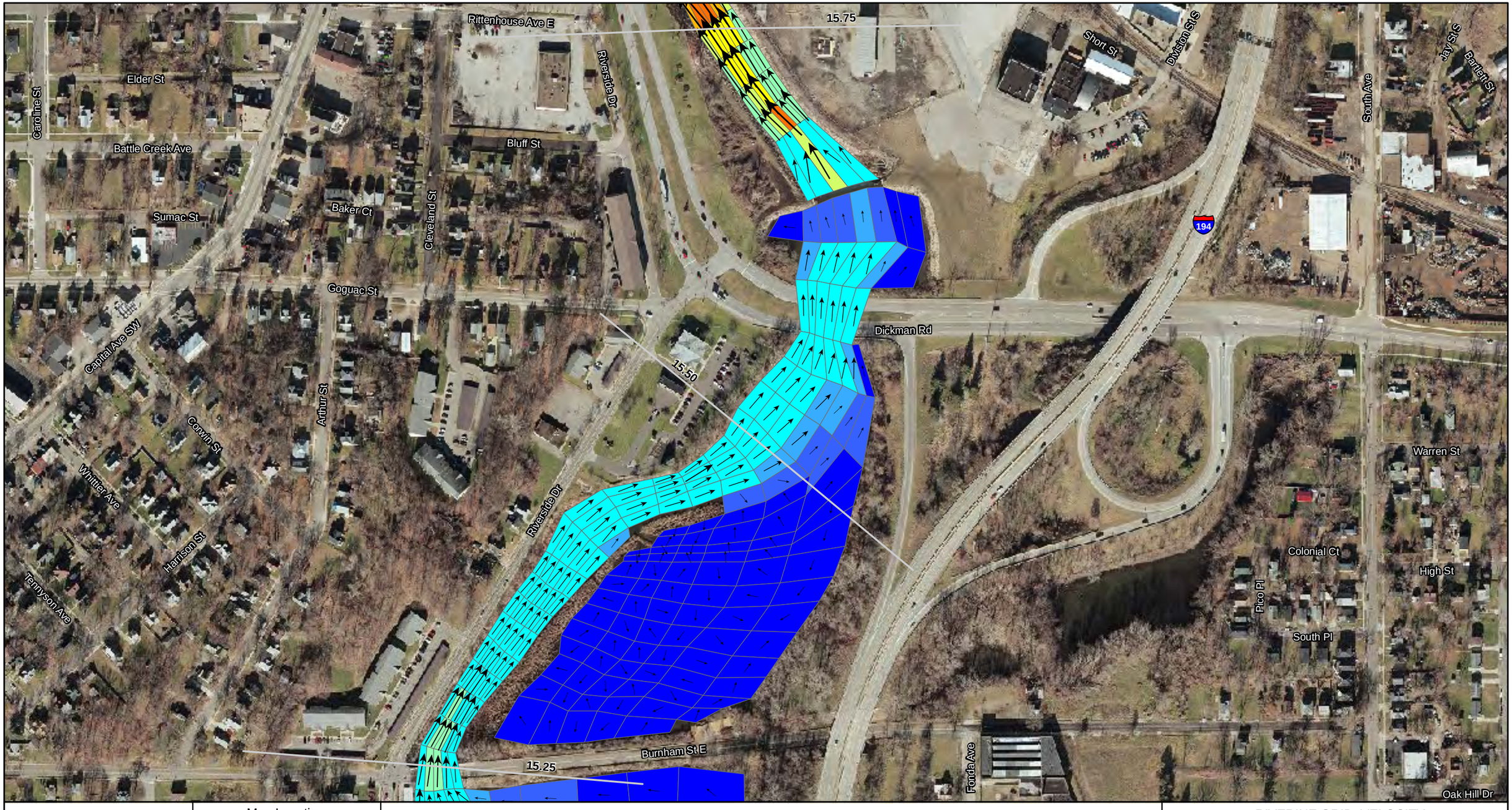
MP 14.65 - MP 15.25

SHEET 18 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep9_2010.mxd

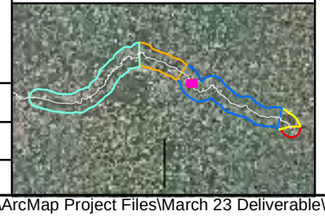
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

MP 15.25 - MP 15.75

SHEET 19 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep9_2010.mxd

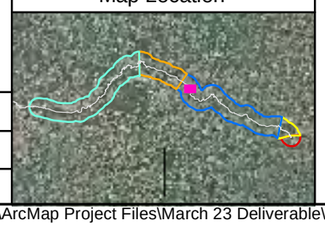
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

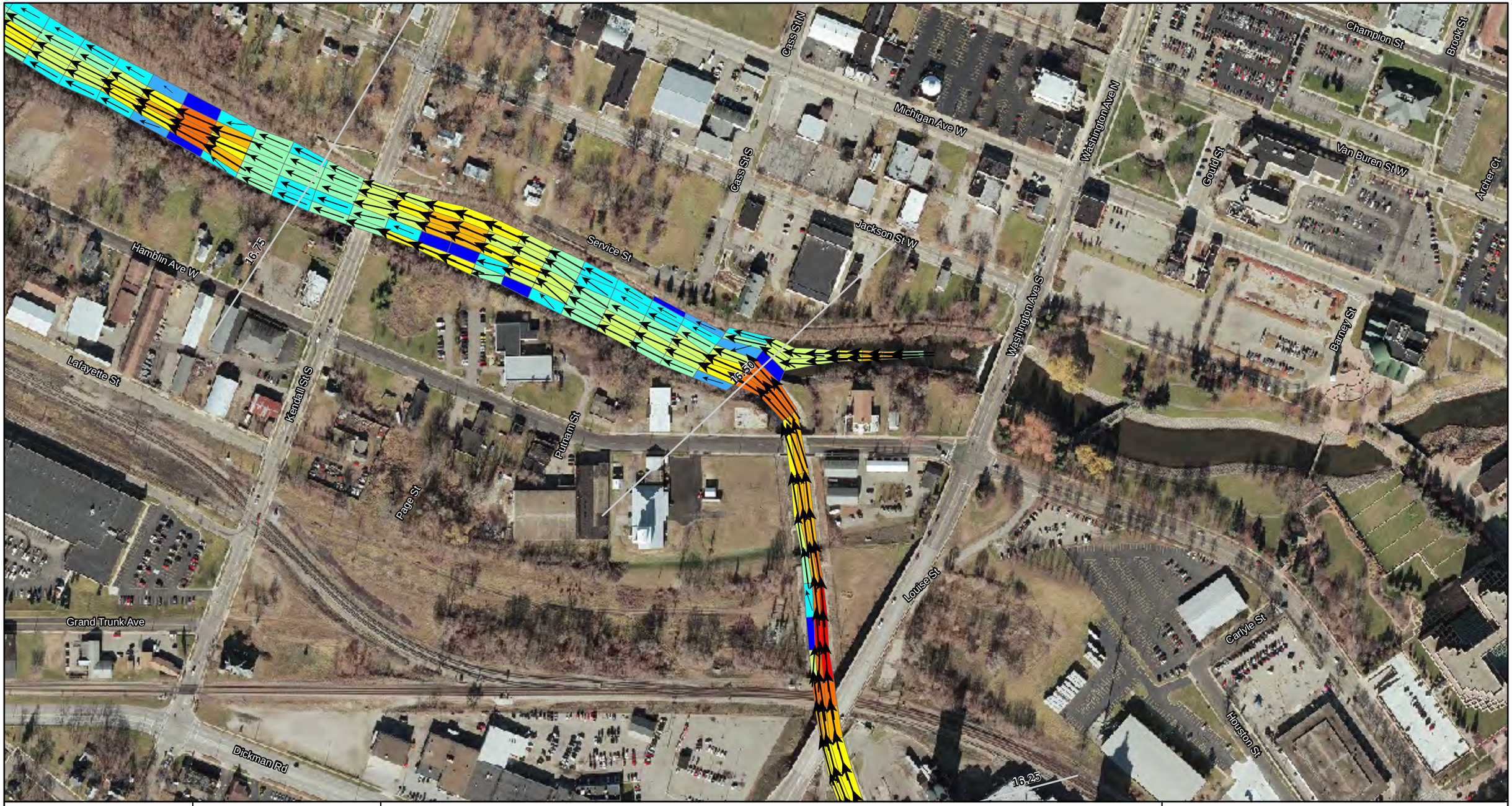
MP 15.75 - MP 16.30

SHEET 20 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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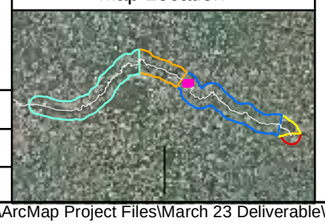
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

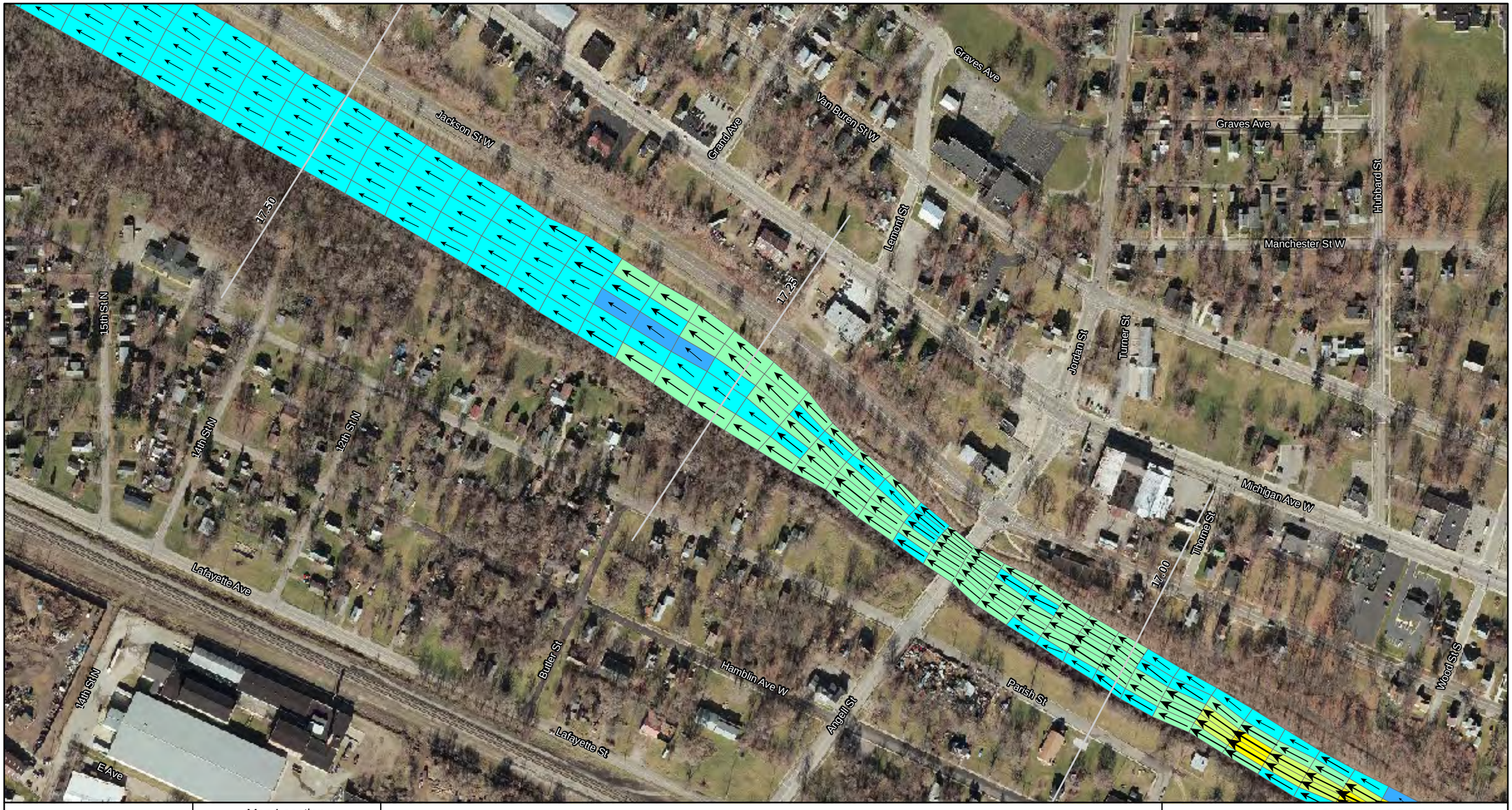
MP 16.30 - MP 16.95

SHEET 21 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep9_2010.mxd

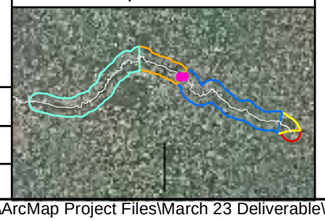
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

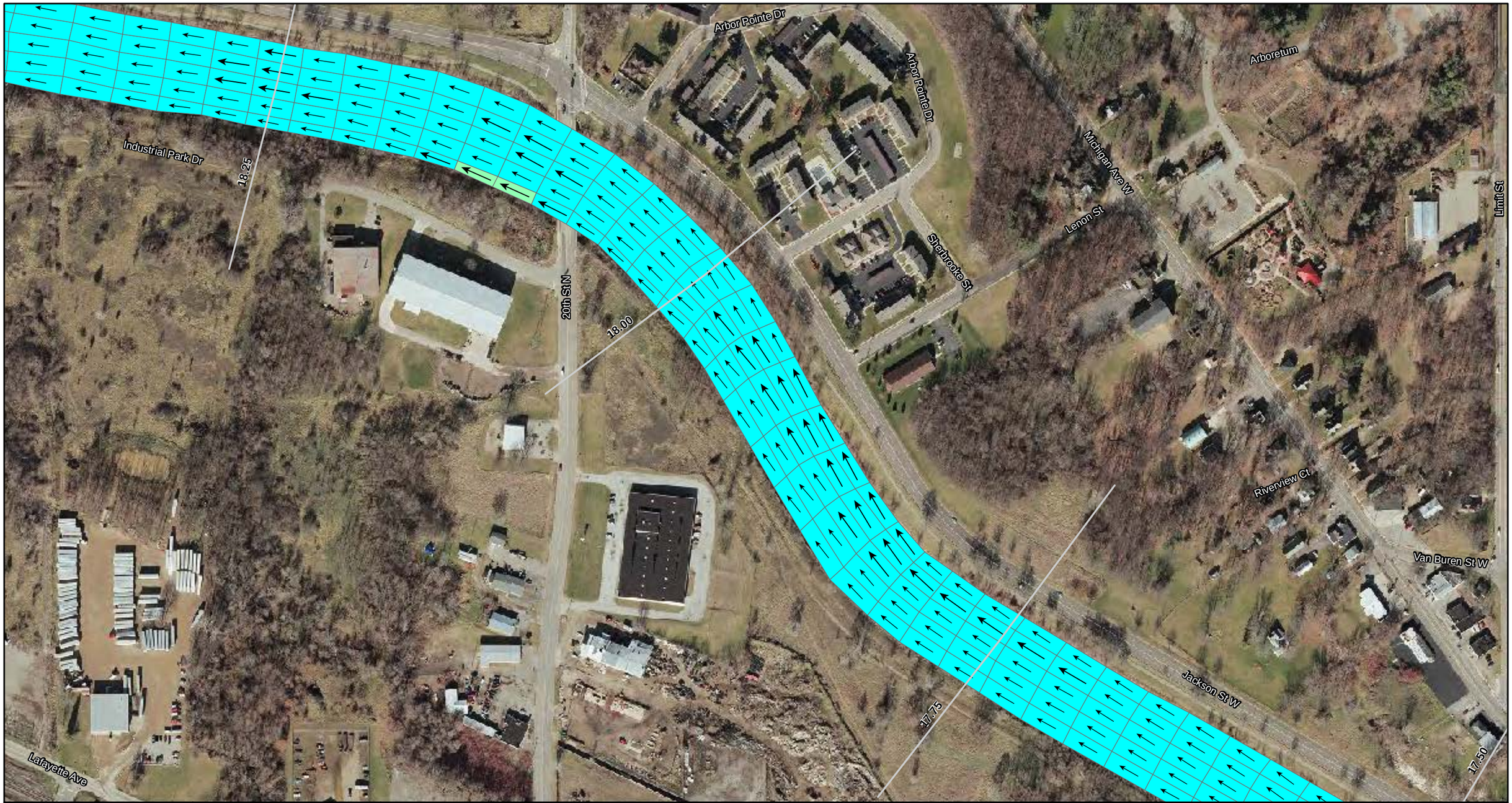
MP 16.85 - MP 17.60

SHEET 22 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep9_2010.mxd

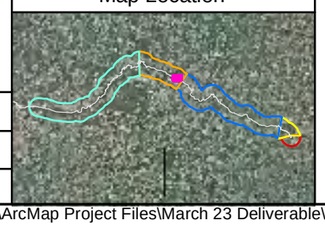
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

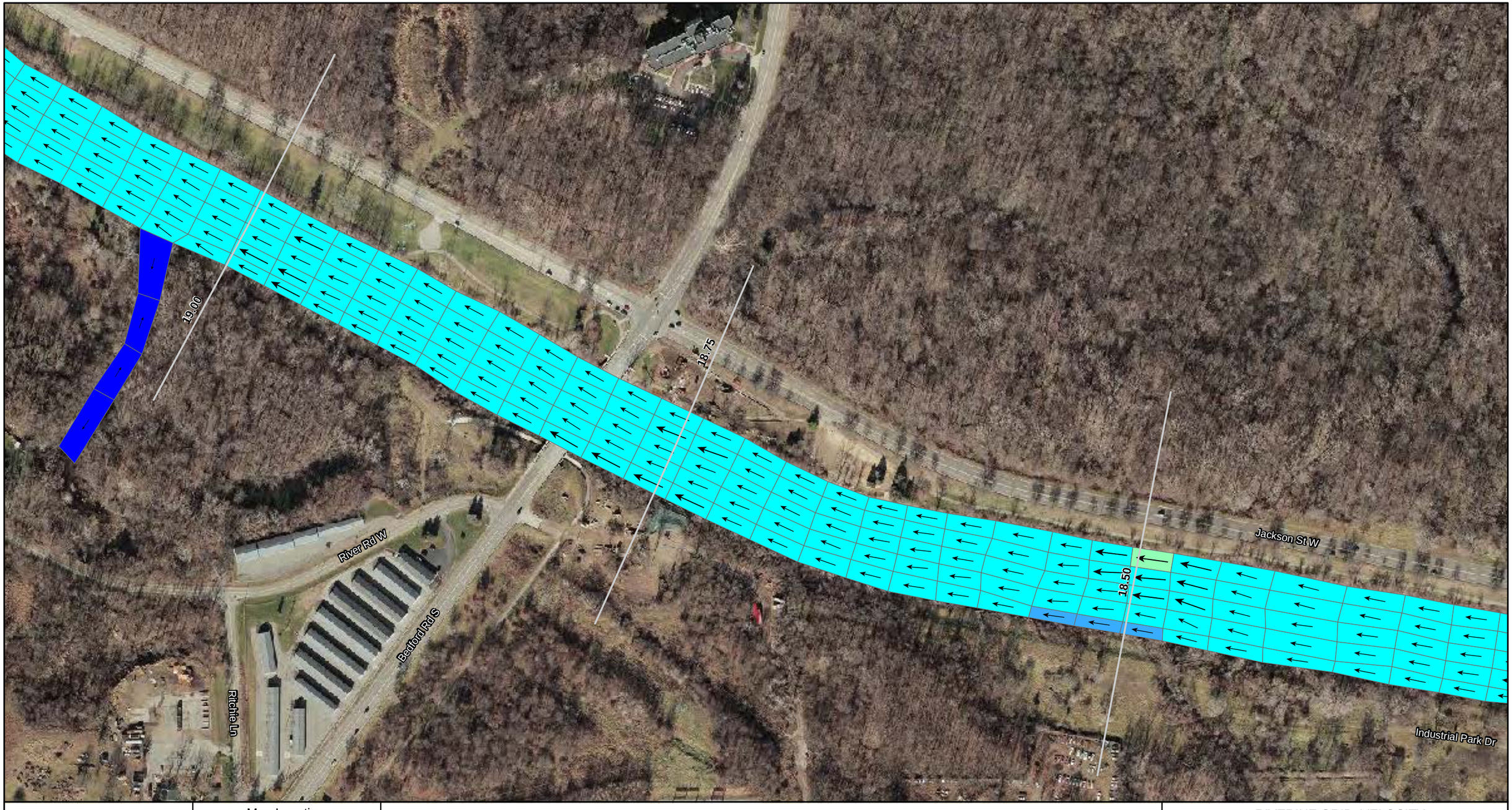
MP 17.60 - MP 18.40

SHEET 23 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep9_2010.mxd

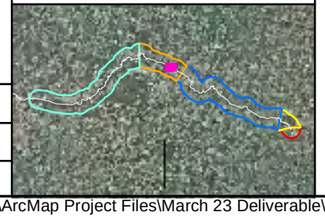
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

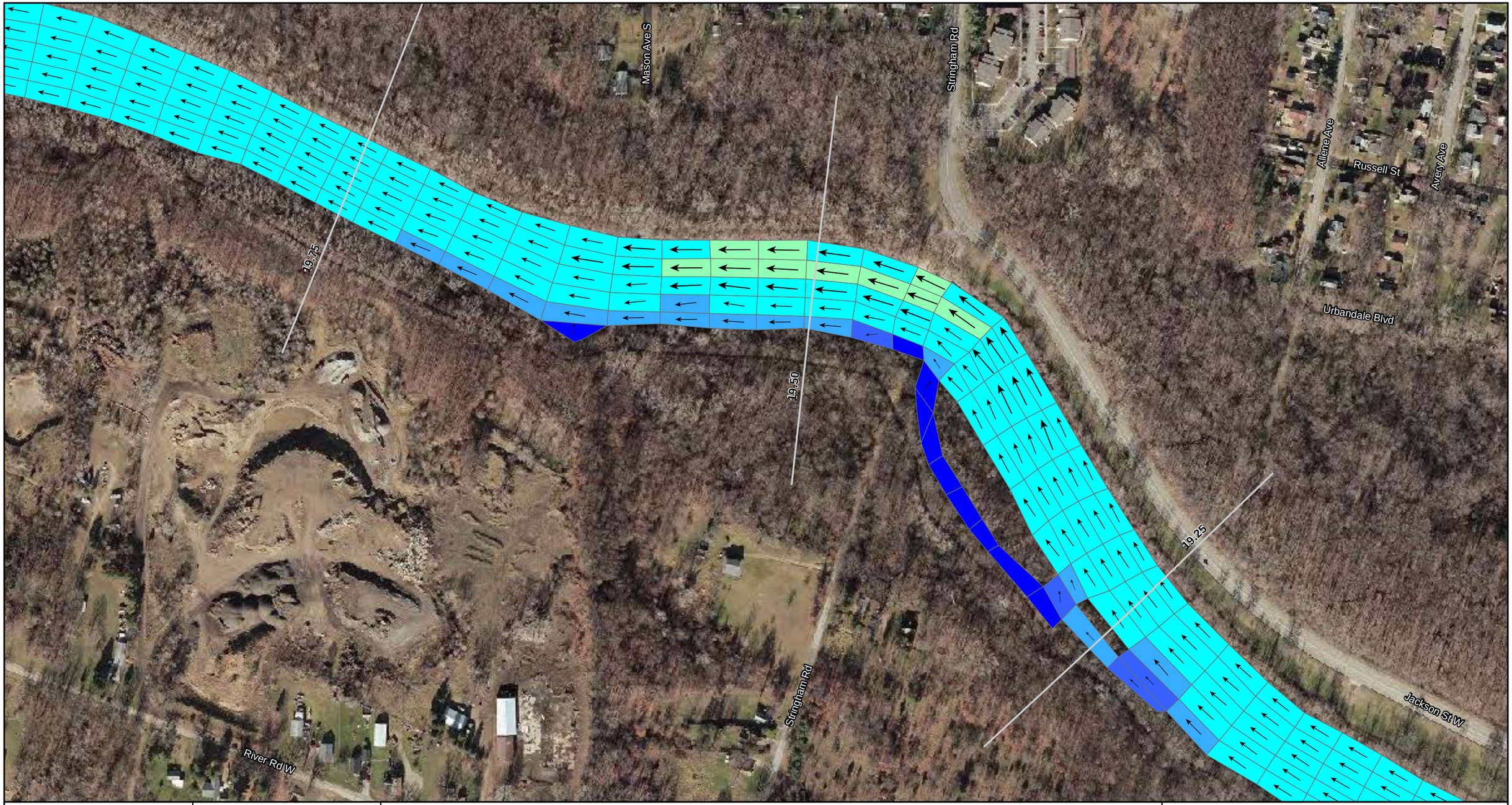
MP 18.30 - MP 19.15

SHEET 24 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep9_2010.mxd

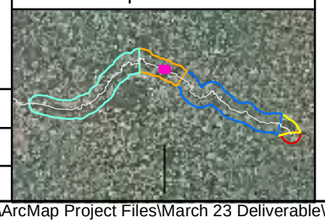
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

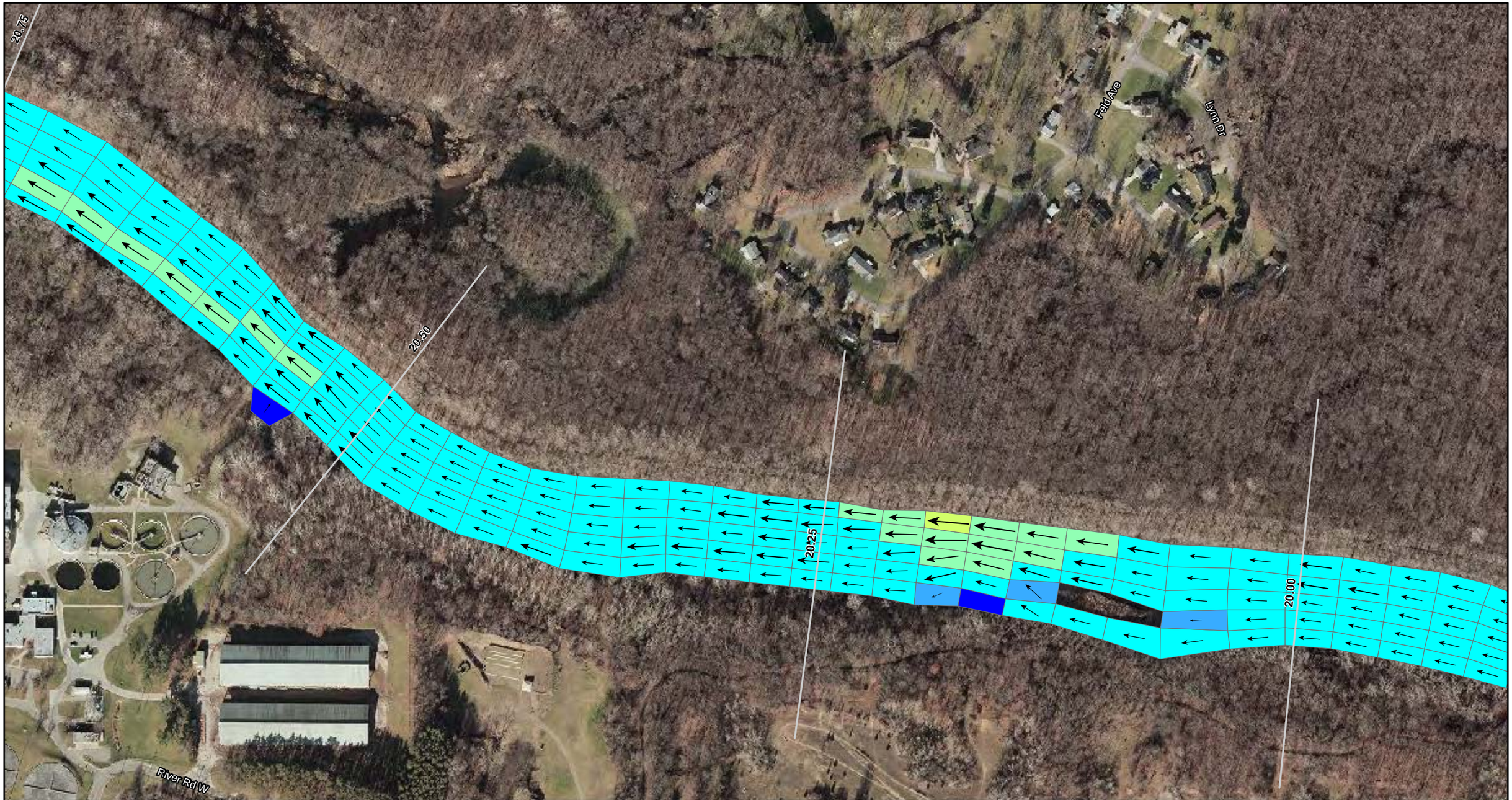
MP 19.10 - MP 19.95

SHEET 25 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

MP 19.90 - MP 20.75

SHEET 26 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

Coldwater Ave

Custer Dr

Stillson Blvd

21.25

21.00

20.75

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

MP 20.70 - MP 21.50

SHEET 27 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

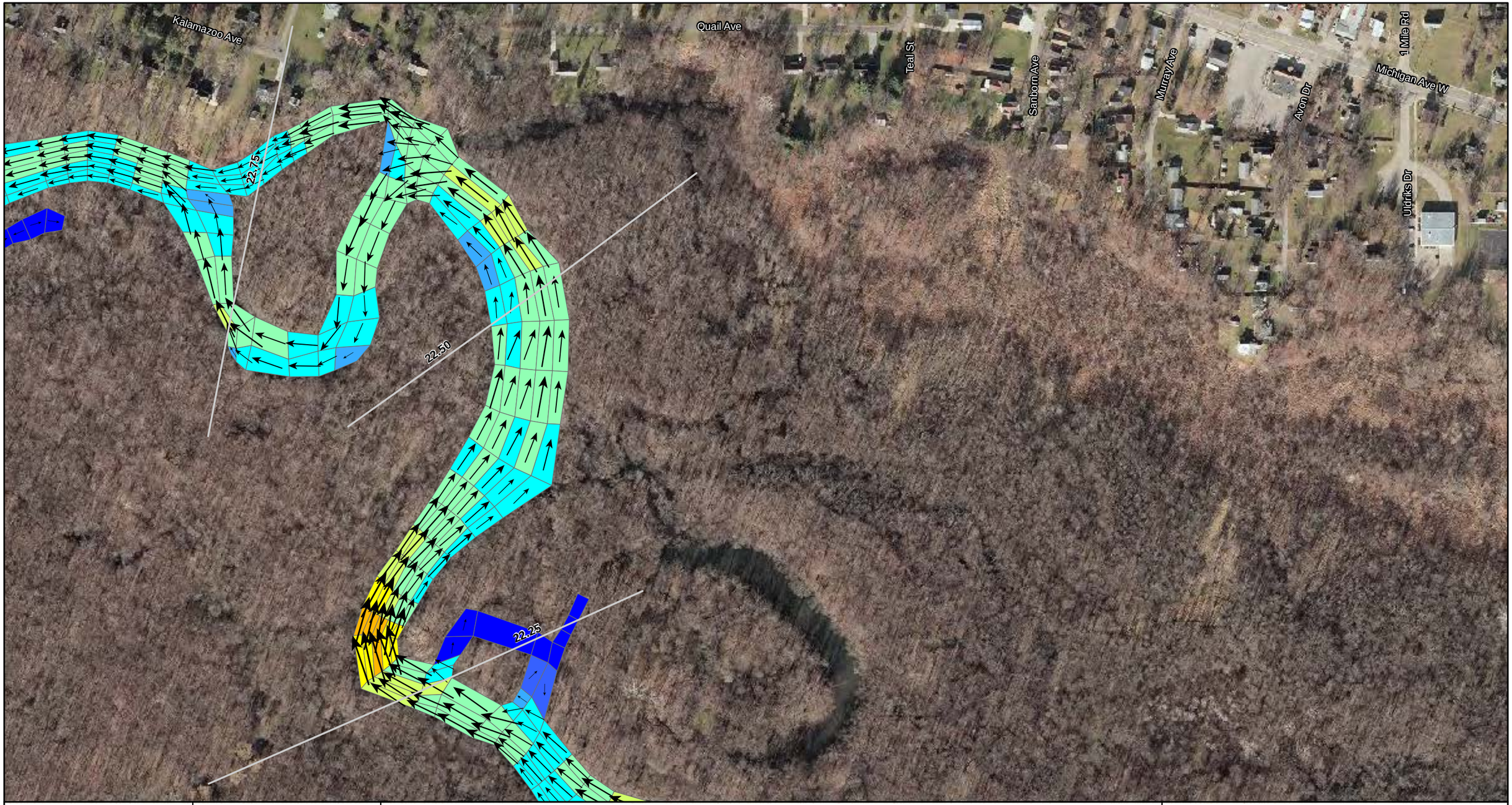
MP 21.35 - MP 22.15

SHEET 28 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep9_2010.mxd

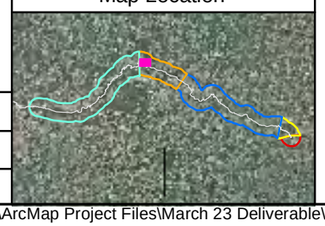
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

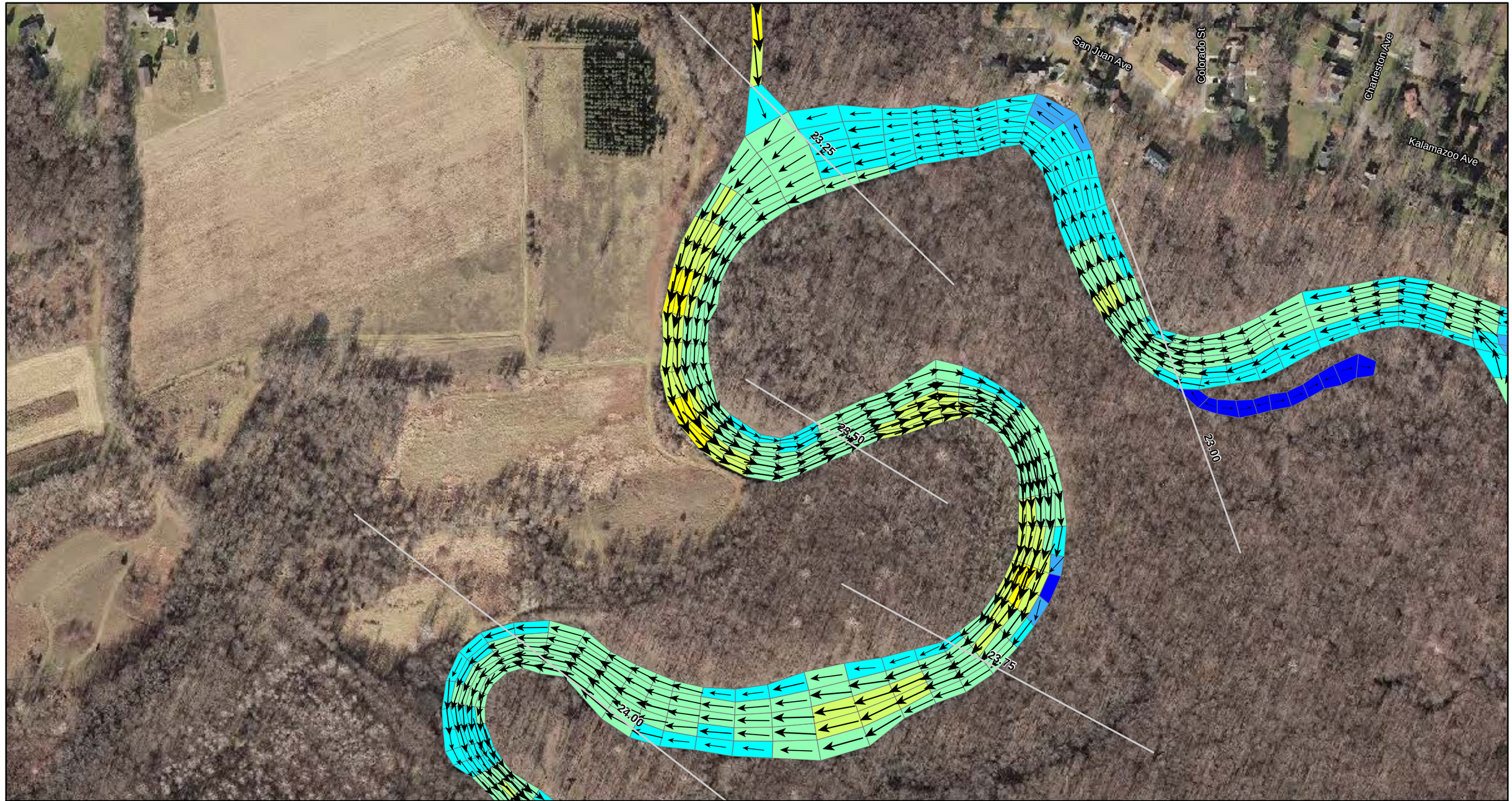
MP 22.15 - MP 22.90

SHEET 29 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep9_2010.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

MP 22.80 - MP 24.10

SHEET 30 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

24.00
24.25
24.50
24.75
River Rd W
Fort Custer Dr
County Line Rd

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

MP 24.10 - MP 24.85

SHEET 31 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep9_2010.mxd

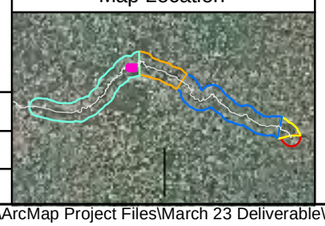
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

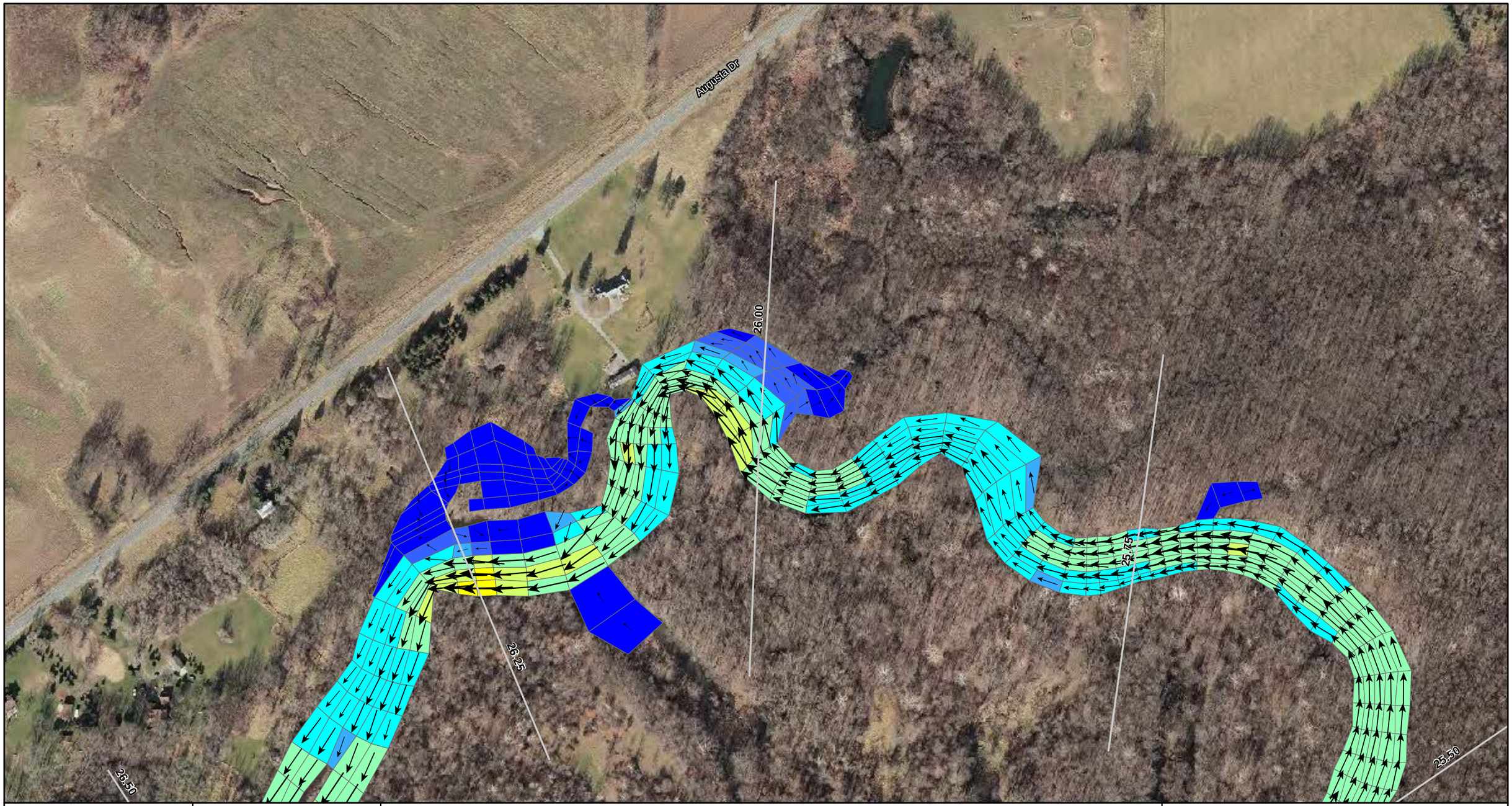
MP 24.80 - MP 25.65

SHEET 32 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

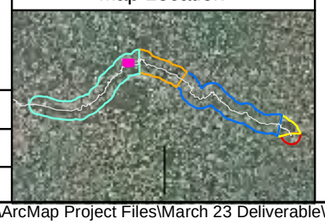
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep9_2010.mxd

Aerial Photography Date: November 2011



Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

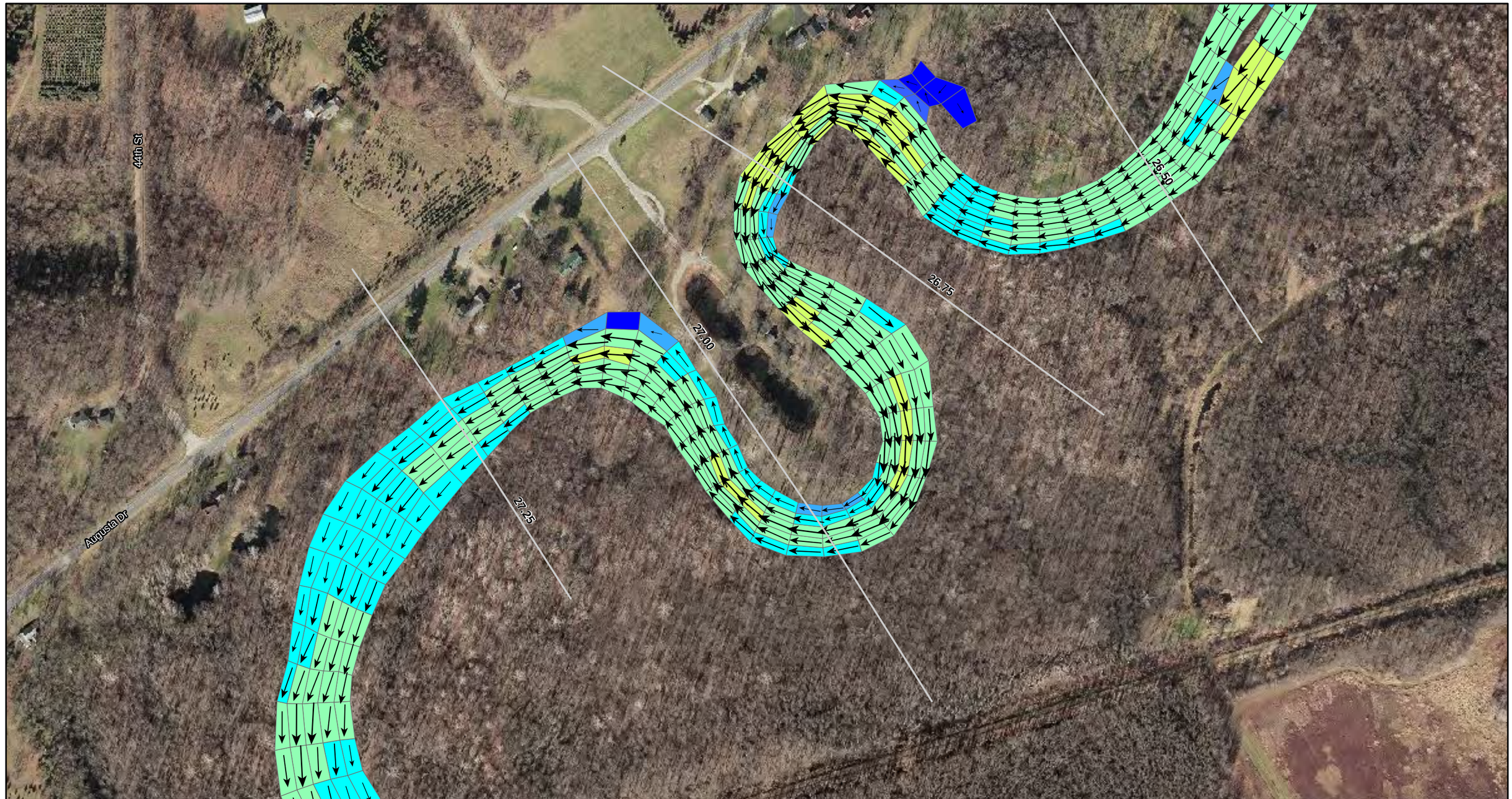
MP 25.55 - MP 26.40

SHEET 33 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

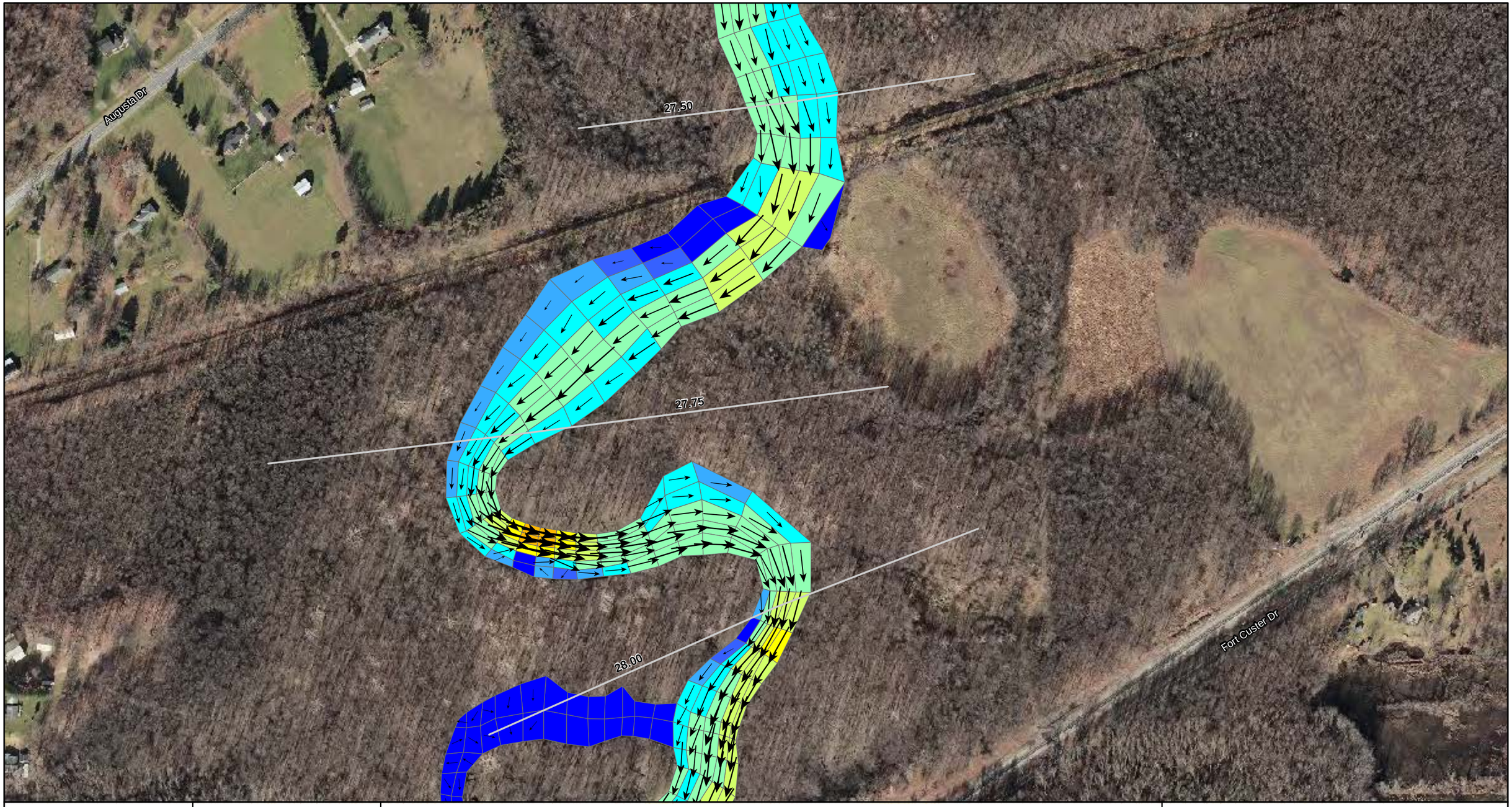
MP 26.40 - MP 27.45

SHEET 34 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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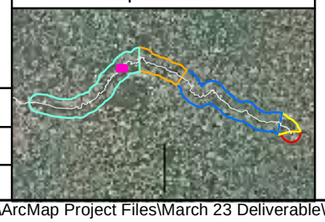
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

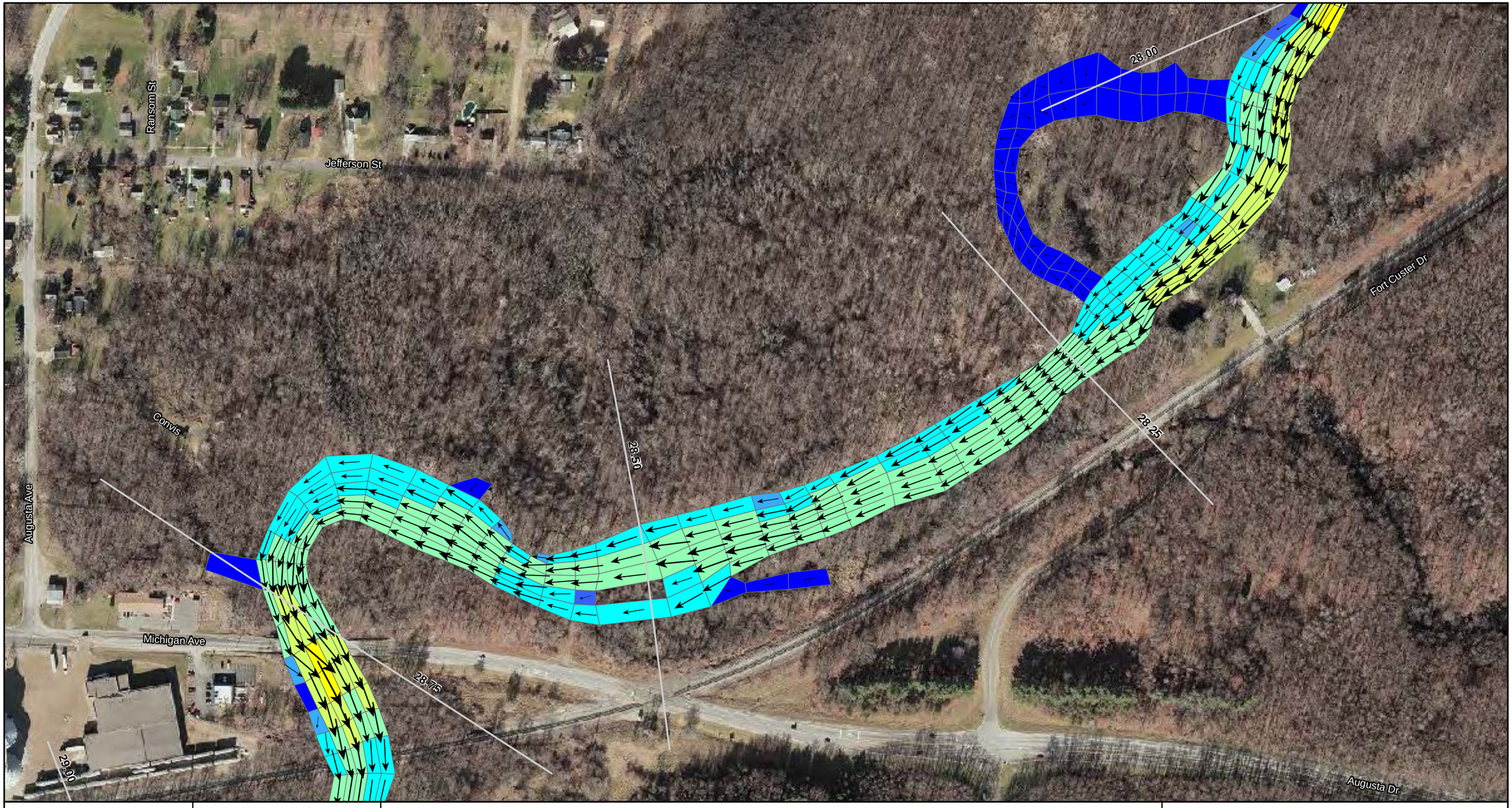
MP 27.45 - MP 28.10

SHEET 35 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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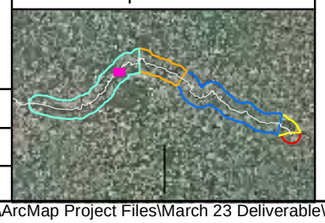
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

MP 28.05 - MP 28.85

SHEET 36 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

Clinton St
Clinton St
Chestnut St
Webster St
Church St
Fayette St
Cass St
Cherry St
Lincoln St
28.75
29.00
29.25
29.50
Augusta Climax Rd
Fort Custer Rec Area Access

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

MP 28.85 - MP29.55

SHEET 37 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

29.50

29.75

Fort Custer Rec Area Service

Fort Custer Rec Area Access

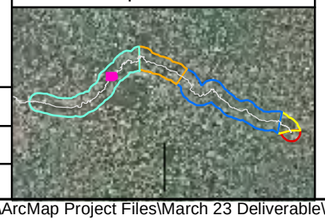
30.25

30.00

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

MP 29.50 - MP29.95

SHEET 38 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

MP 29.95 - MP 30.80

SHEET 39 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

MP 30.75 - MP 31.25

SHEET 40 OF 56

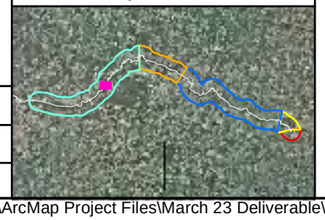
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep9_2010.mxd

Aerial Photography Date: November 2011



Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

MP 31.25 - MP 31.70

SHEET 41 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

31.75

32.00

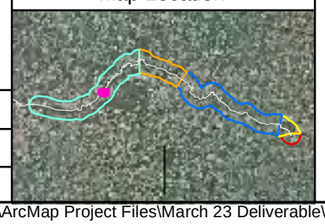
32.25

Bicycle Trail

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

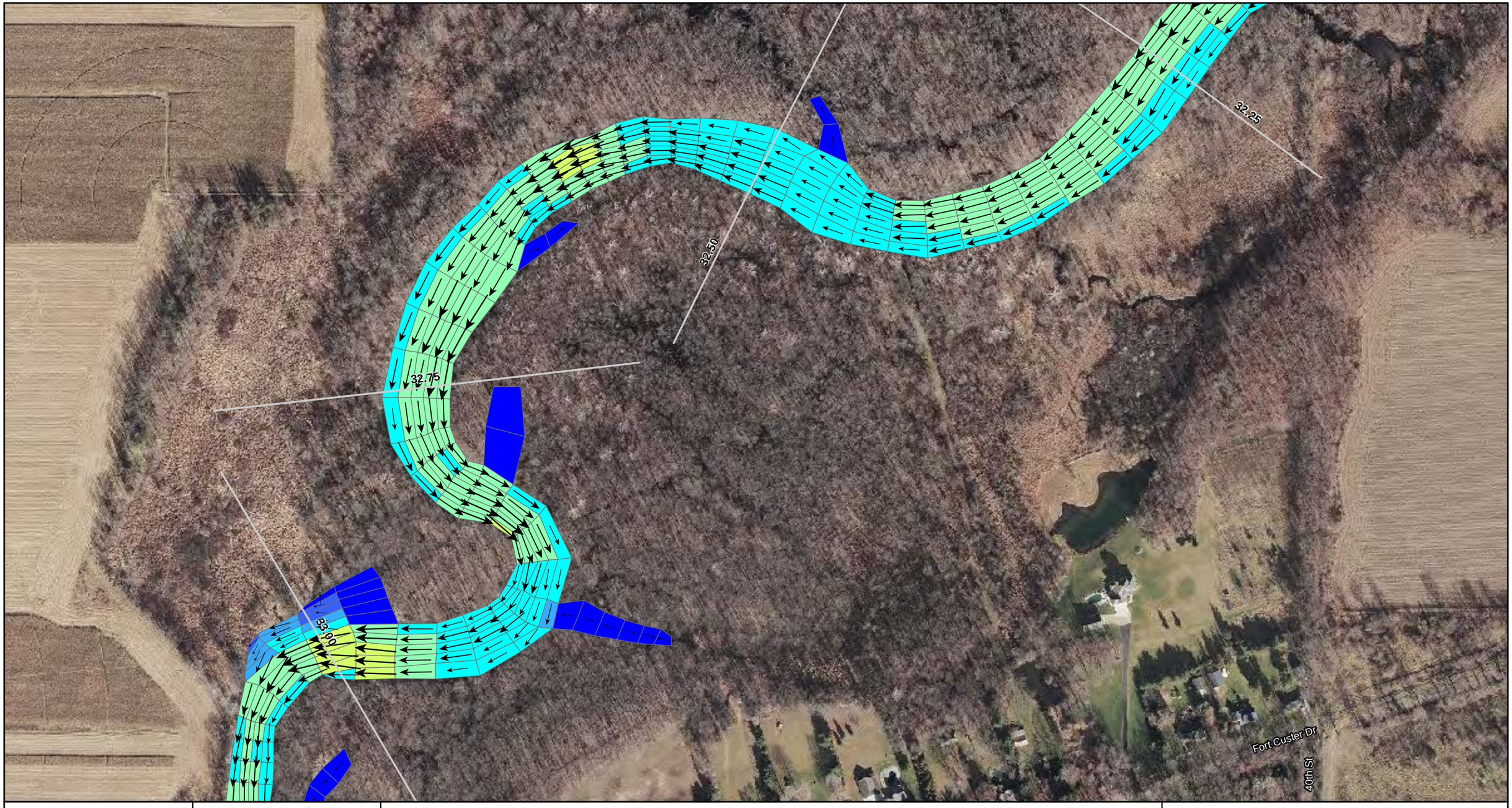
MP 31.65 - MP 32.25

SHEET 42 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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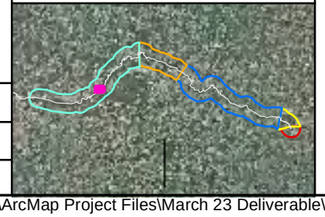
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

MP 32.25 - MP 33.10

SHEET 43 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

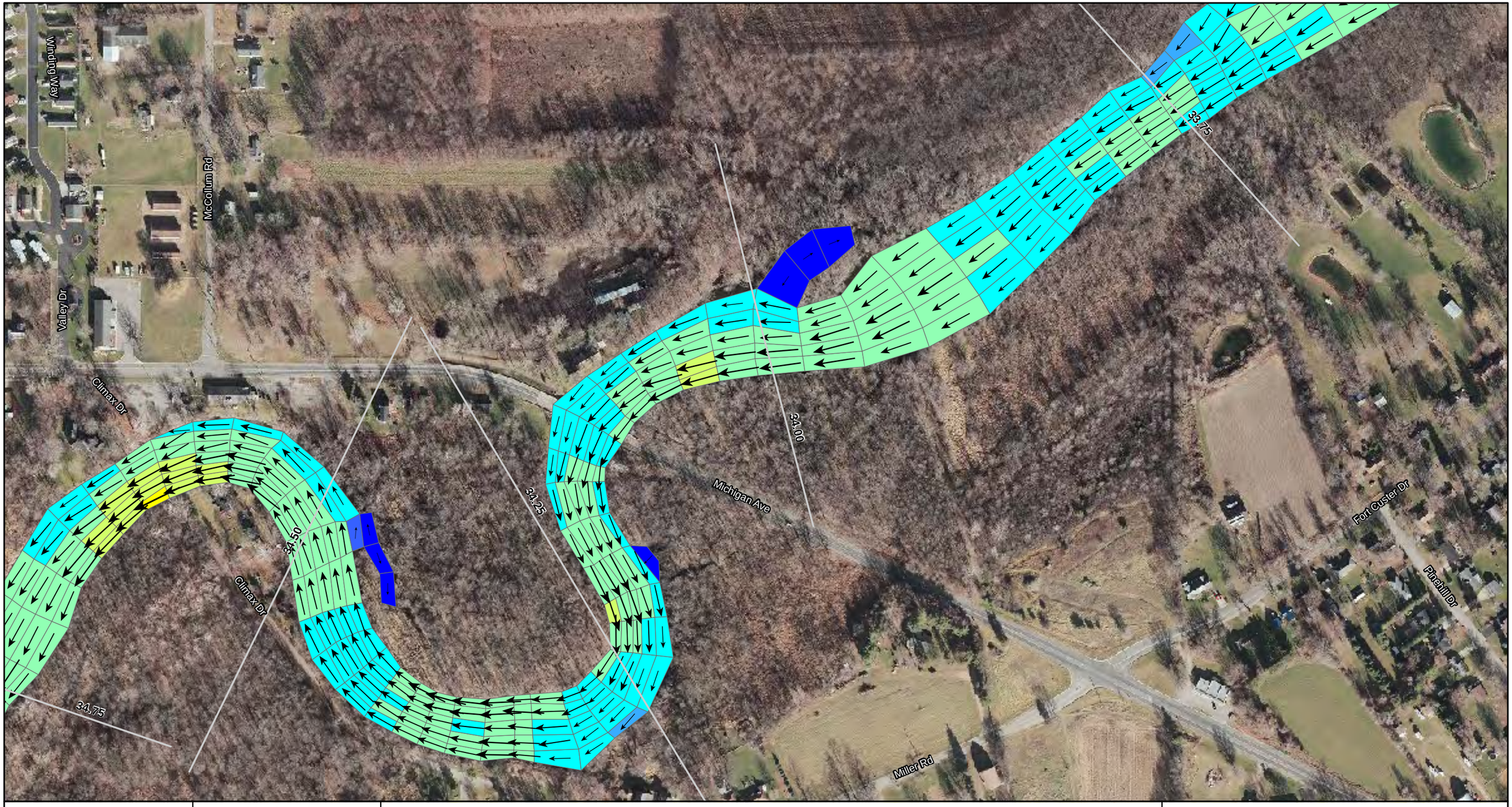
MP 33.10 - MP 33.70

SHEET 44 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep9_2010.mxd

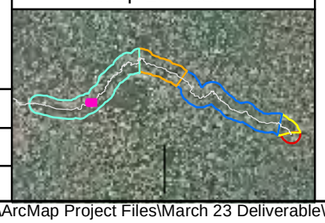
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

MP 33.70 - MP 34.70

SHEET 45 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

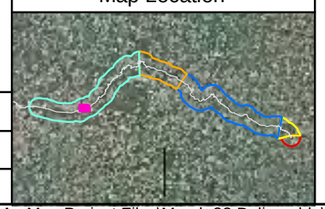
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep9_2010.mxd

Aerial Photography Date: November 2011



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

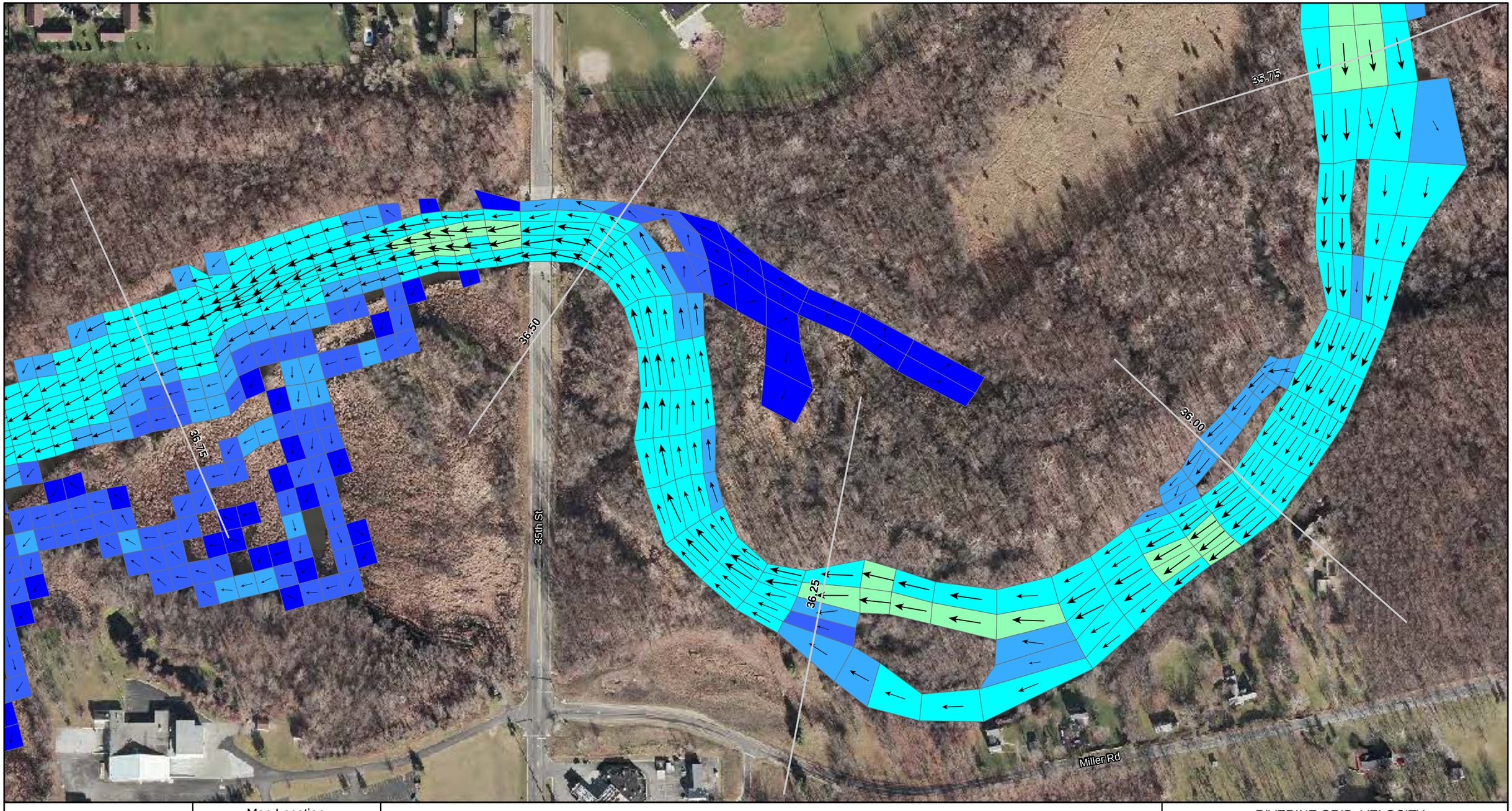
MP 34.70 - MP 35.75

SHEET 46 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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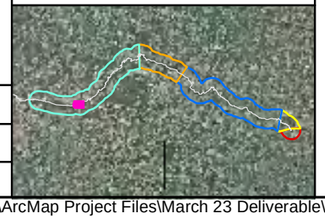
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

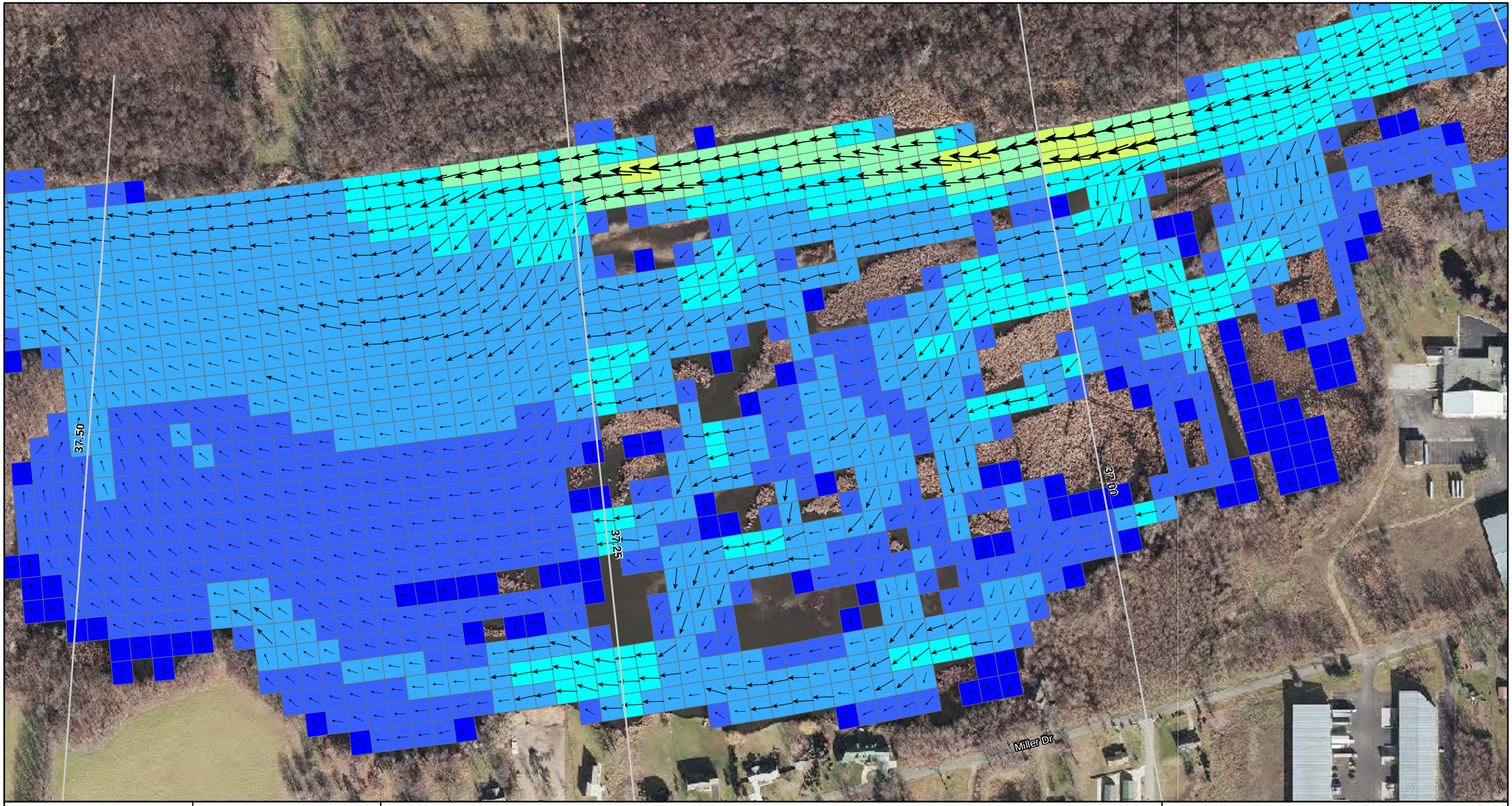
MP 35.75 - MP 36.80

SHEET 47 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep9_2010.mxd

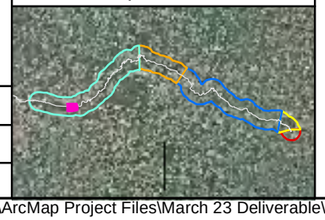
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

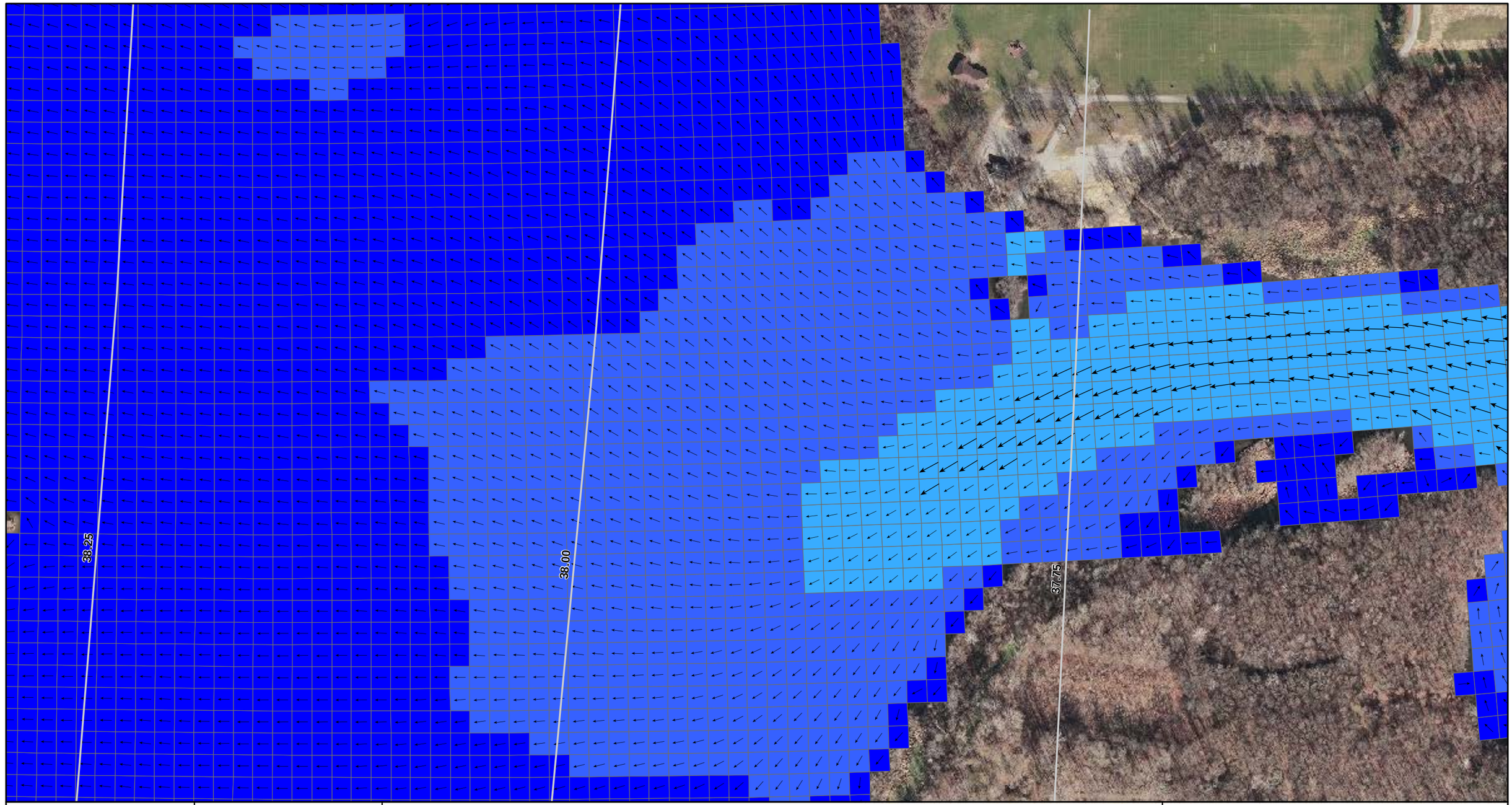
MP 36.80 - MP 37.55

SHEET 48 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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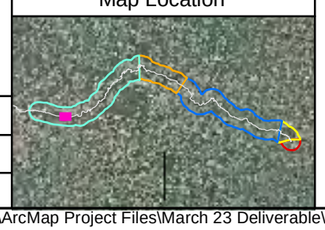
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

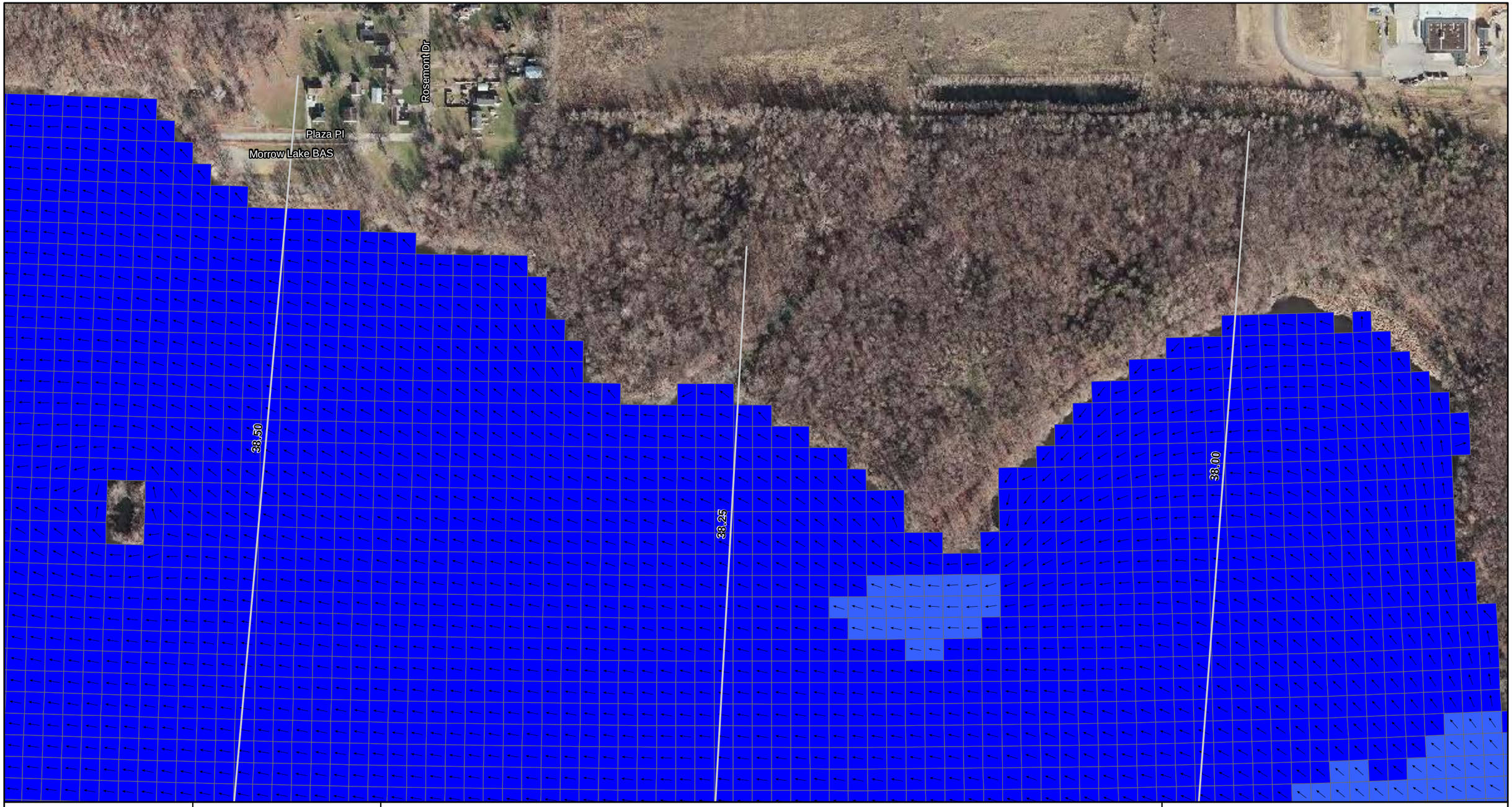
MP 37.55 - MP 38.30

SHEET 49 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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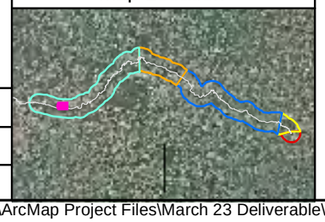
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

MP 37.80 - MP 38.60N

SHEET 50 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

38.50

38.25

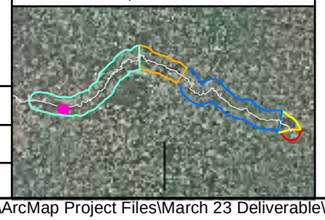
38.00

Lyth Rd

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

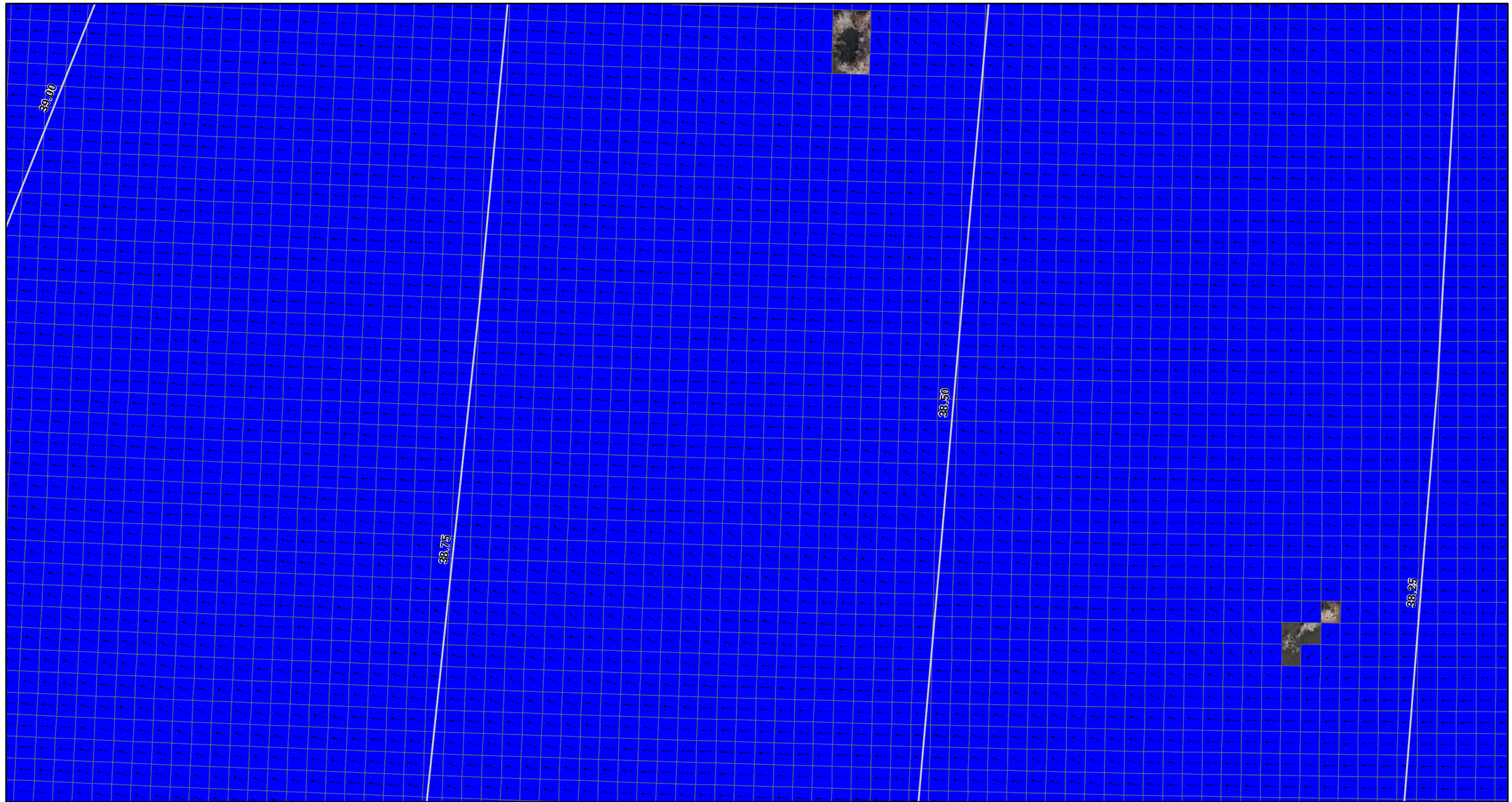
MP 37.80 - MP 38.60S

SHEET 51 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

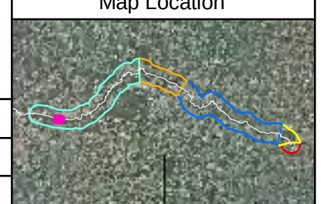
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Aerial Photography Date: November 2011



Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

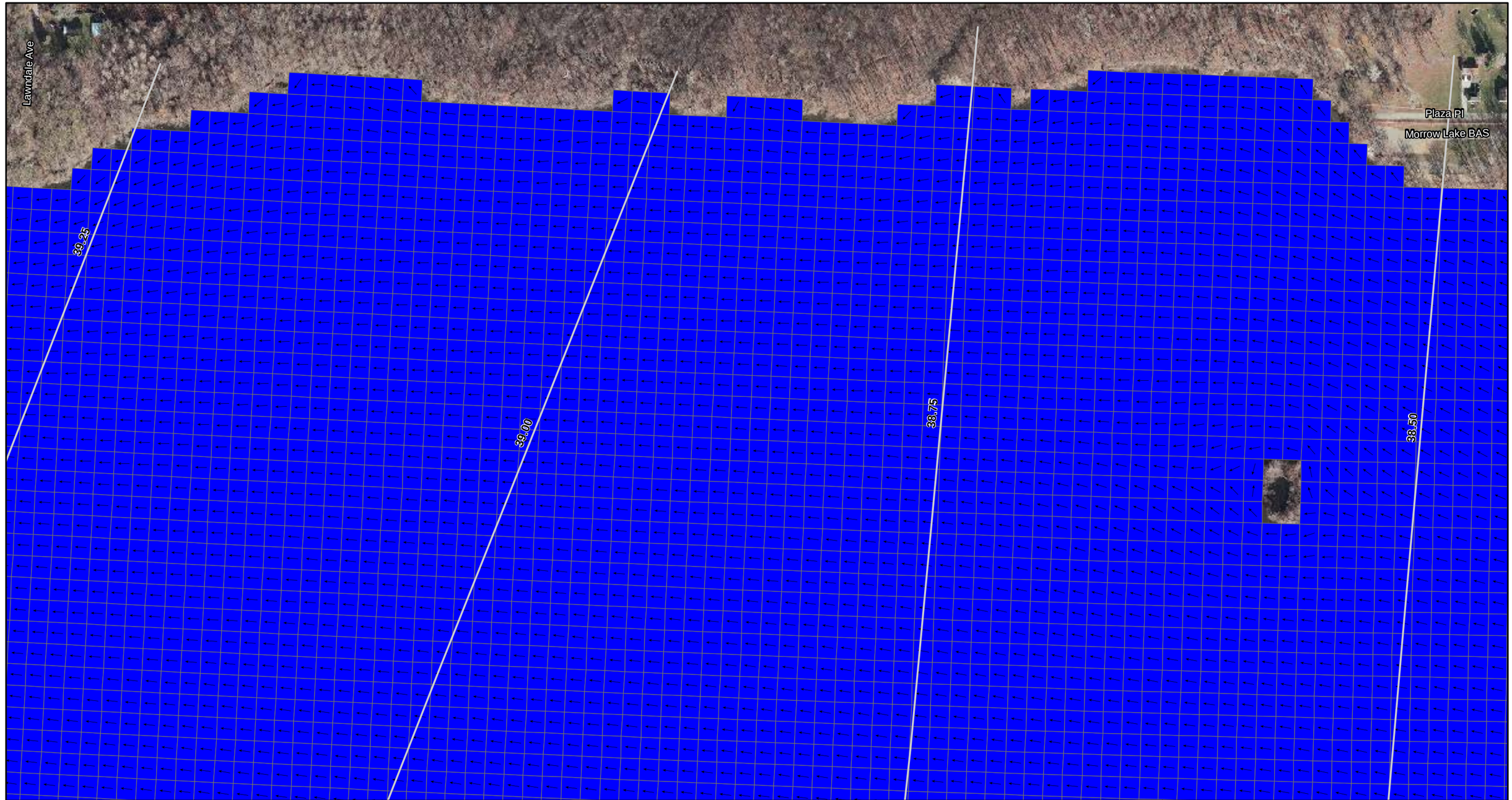
MP 38.25 - MP 39.00C

SHEET 52 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

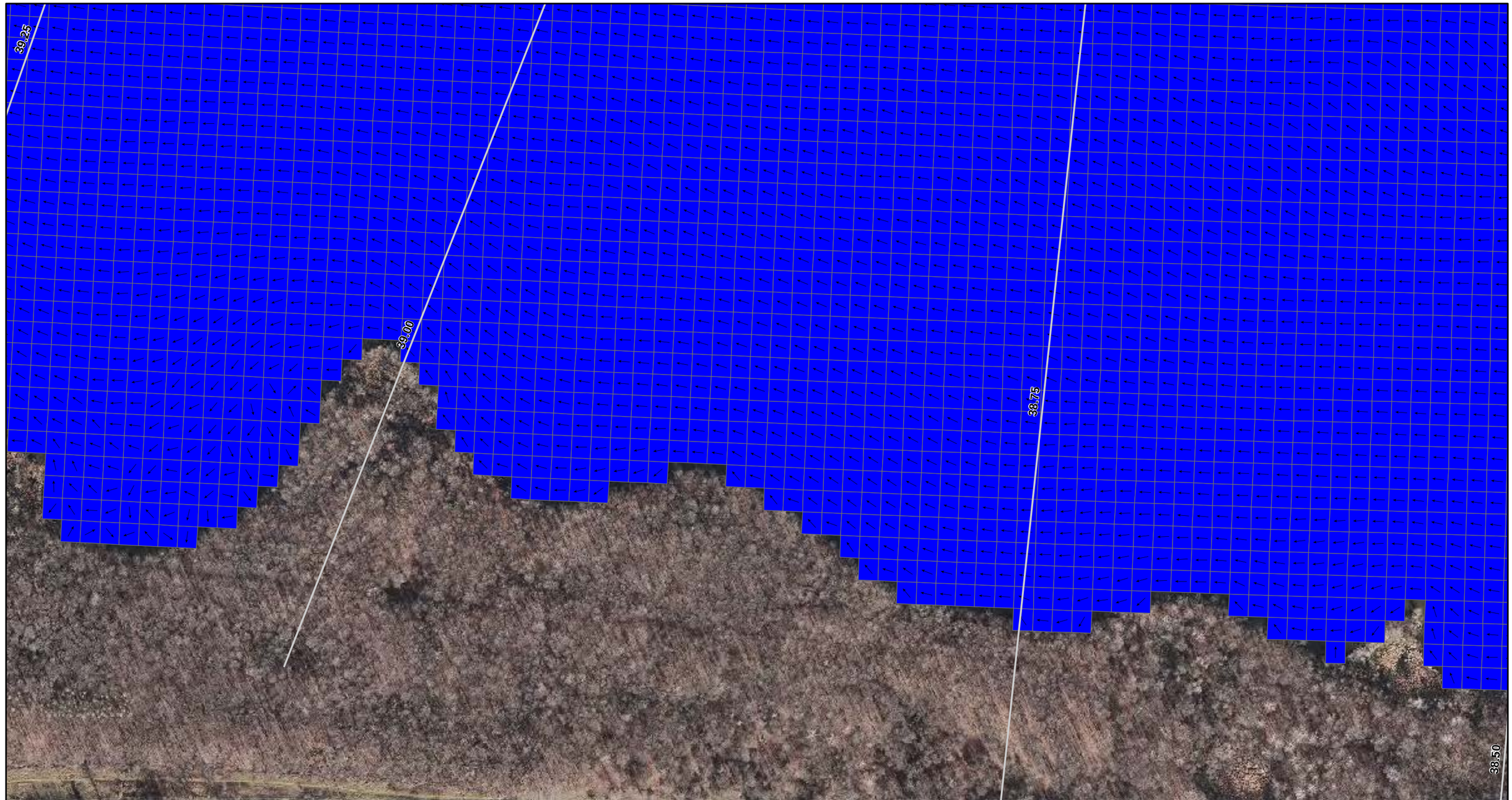
MP 38.50 - MP 39.25N

SHEET 53 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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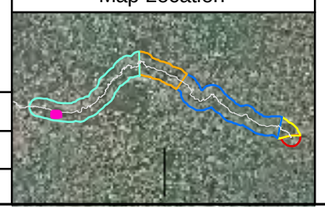
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

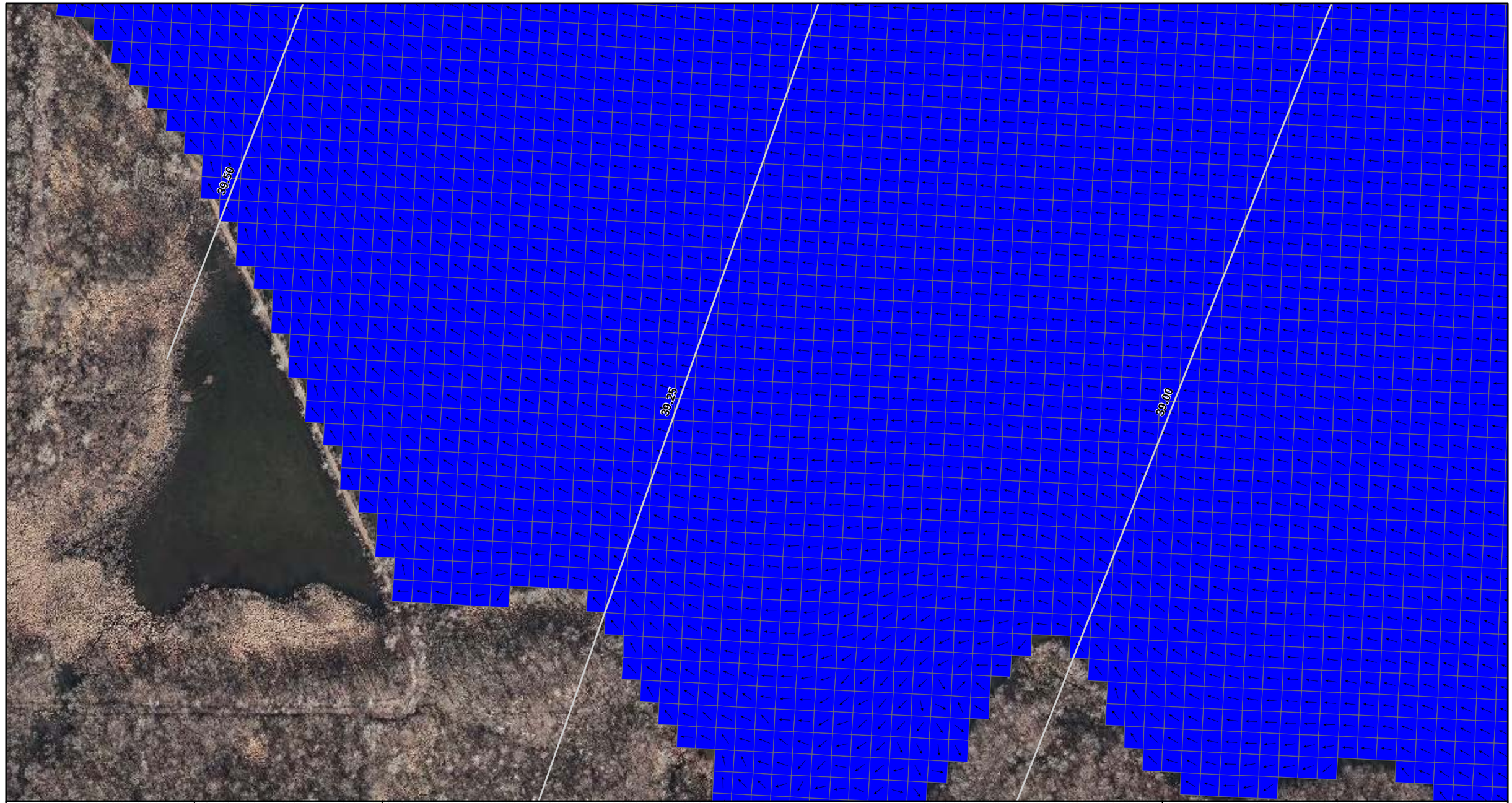
MP 38.50 - MP 39.25S

SHEET 54 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

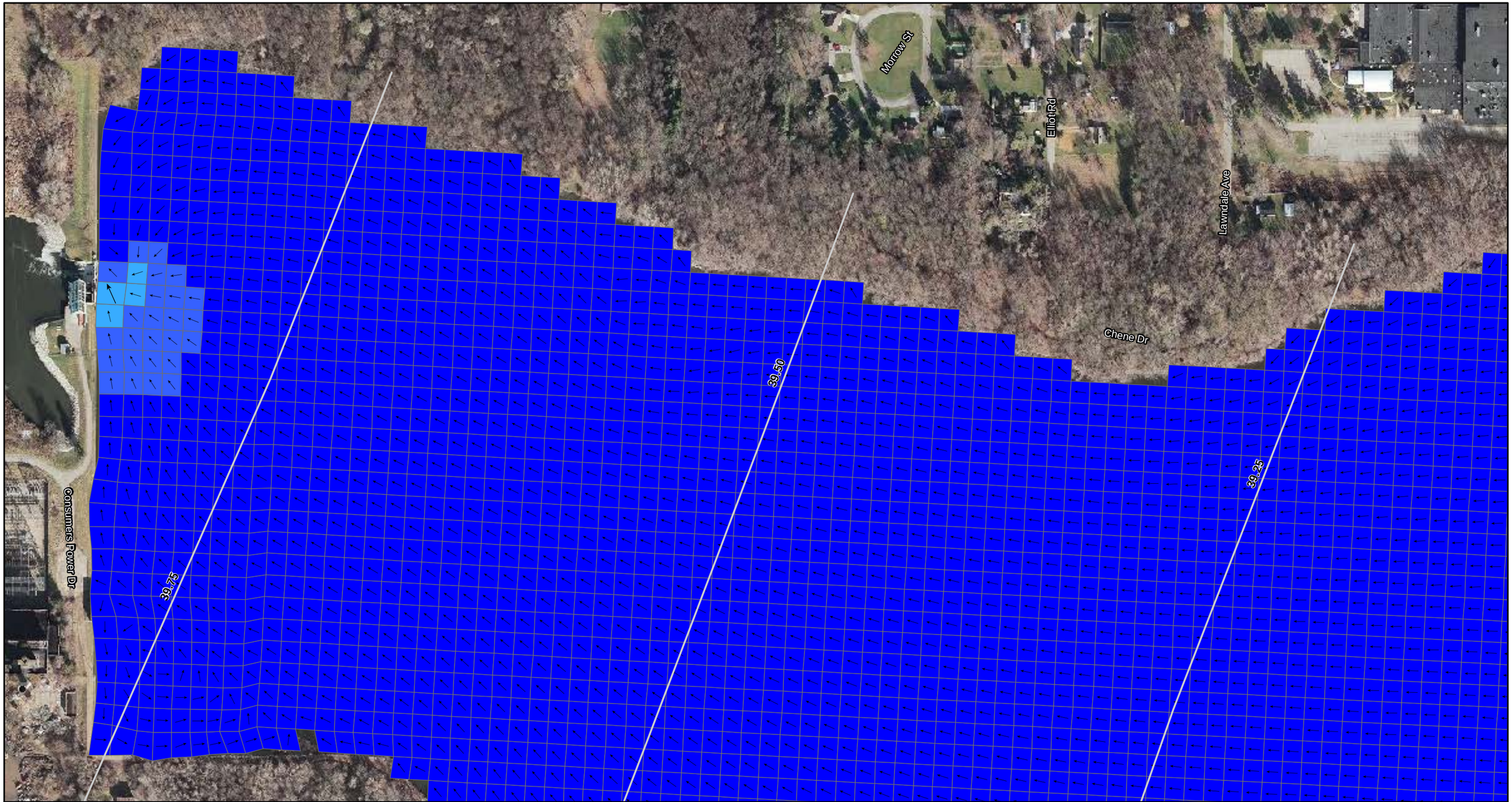
MP 38.90 - MP 39.60S

SHEET 55 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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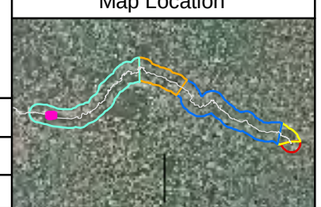
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 9, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 9, 2010

MP 39.15 - MP 39.85

SHEET 56 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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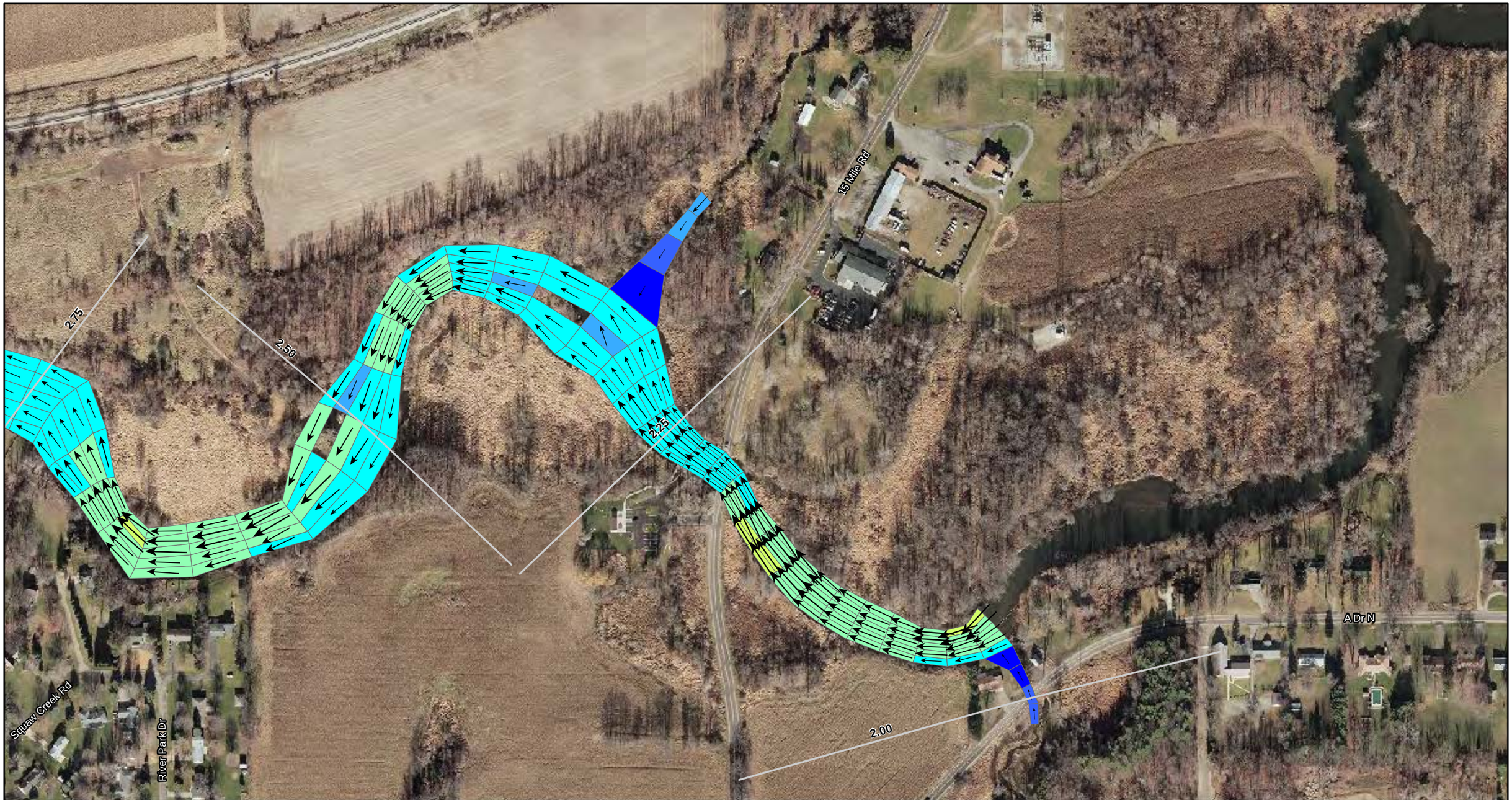
Aerial Photography Date: November 2011

Figure 6-5

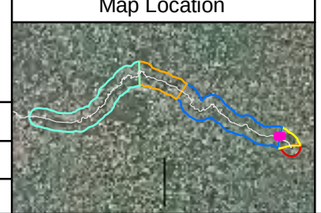
Riverine Grid: Velocity

September 10, 2010

Sheets 1 through 56



Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

MP 01.95 - MP 02.75

SHEET 1 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

3.25

3.00

2.50

2.75

Friendship Ln

Heather Dr

Peter Pan Ln

Kristen Dr

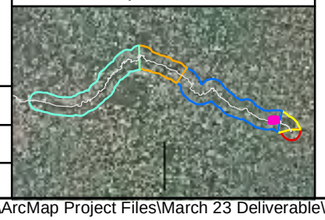
Squaw Creek Rd

River Park Dr

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

MP 02.60 - MP 03.40

SHEET 2 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

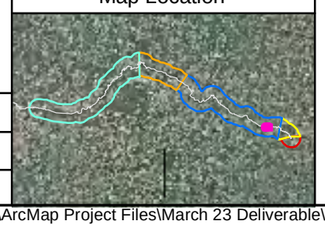
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

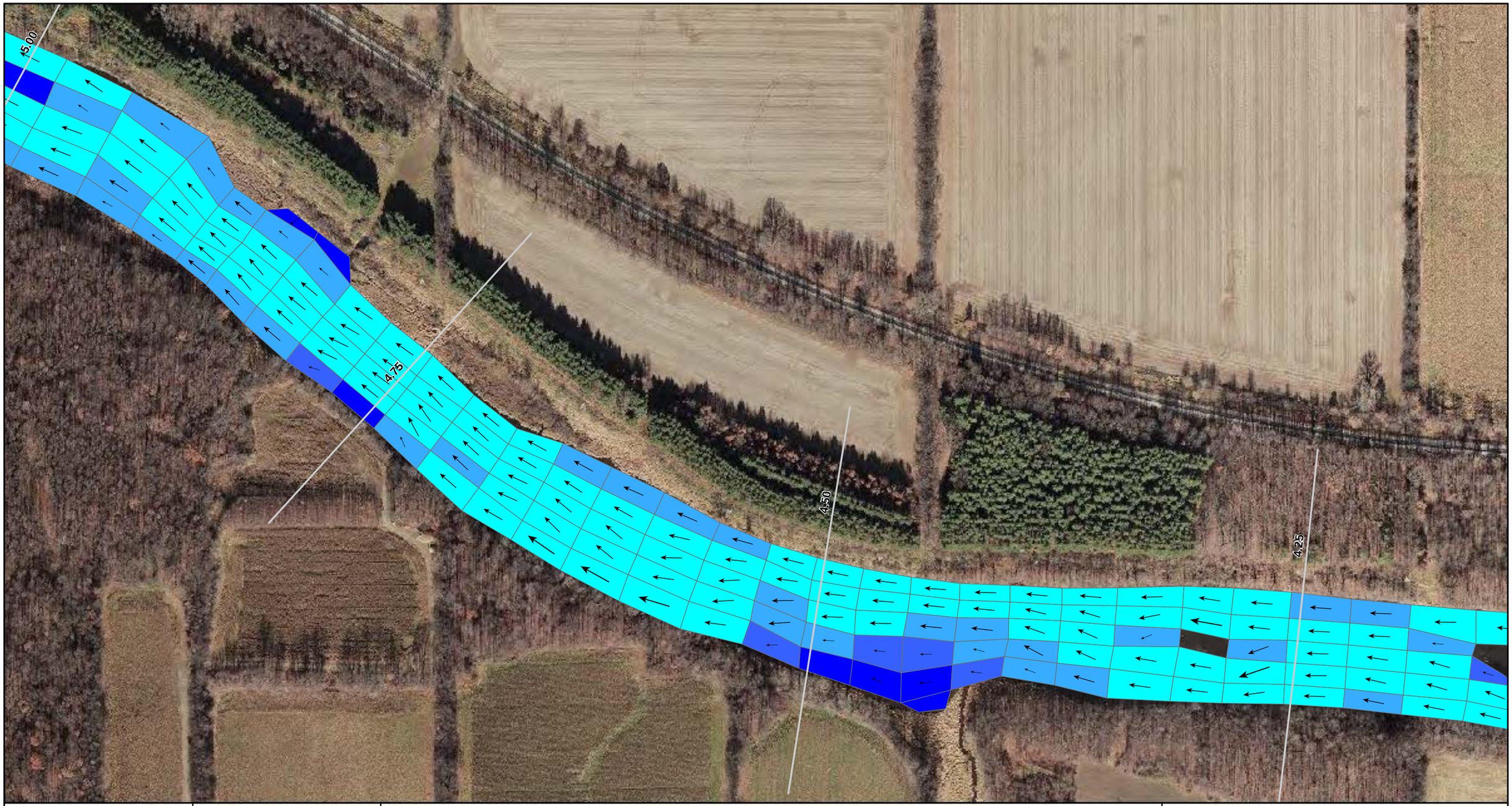
MP 03.40 - MP 04.20

SHEET 3 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

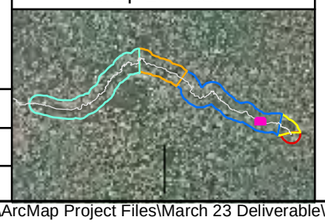
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

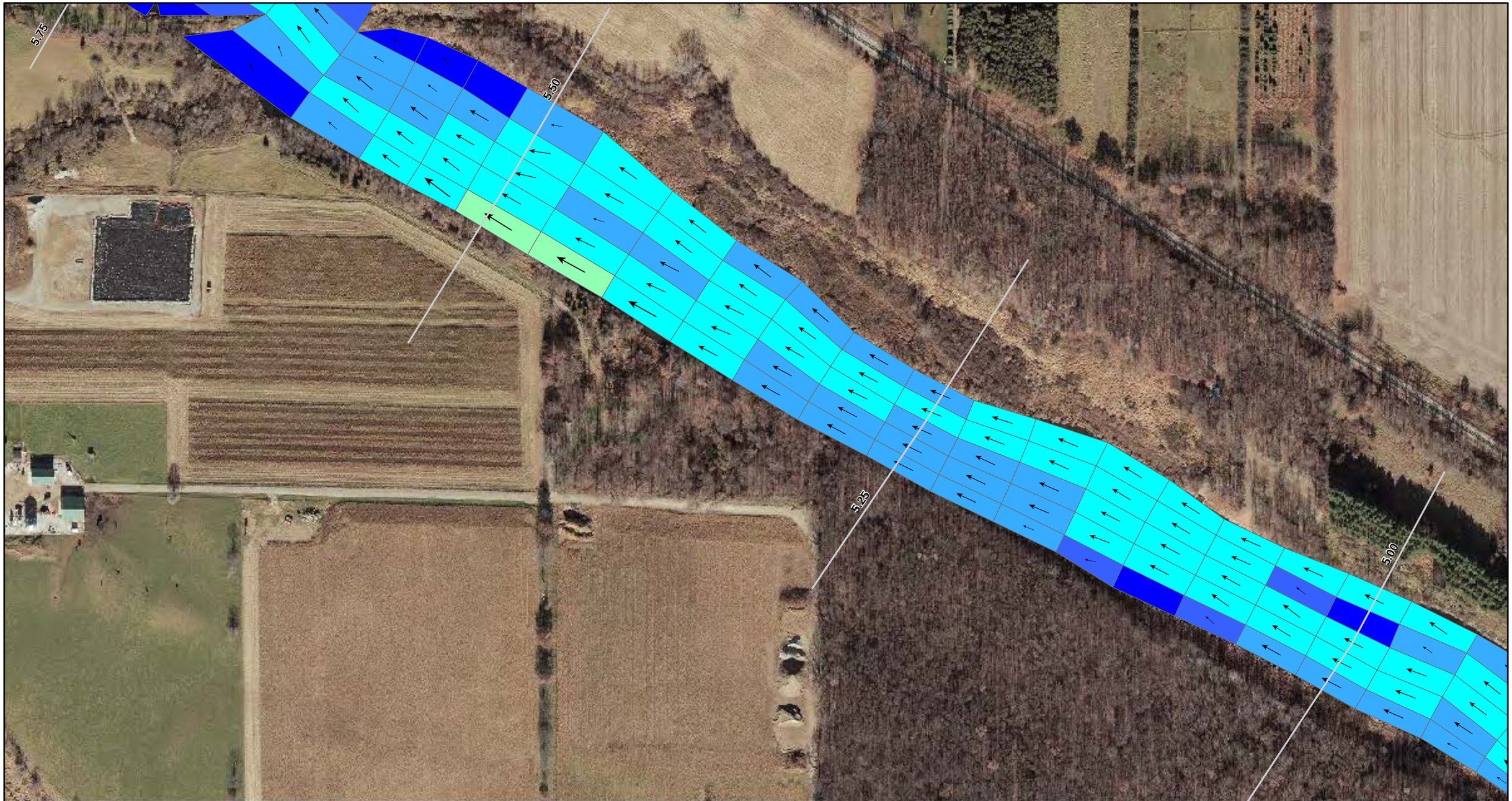
MP 04.15 - MP 05.00

SHEET 4 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

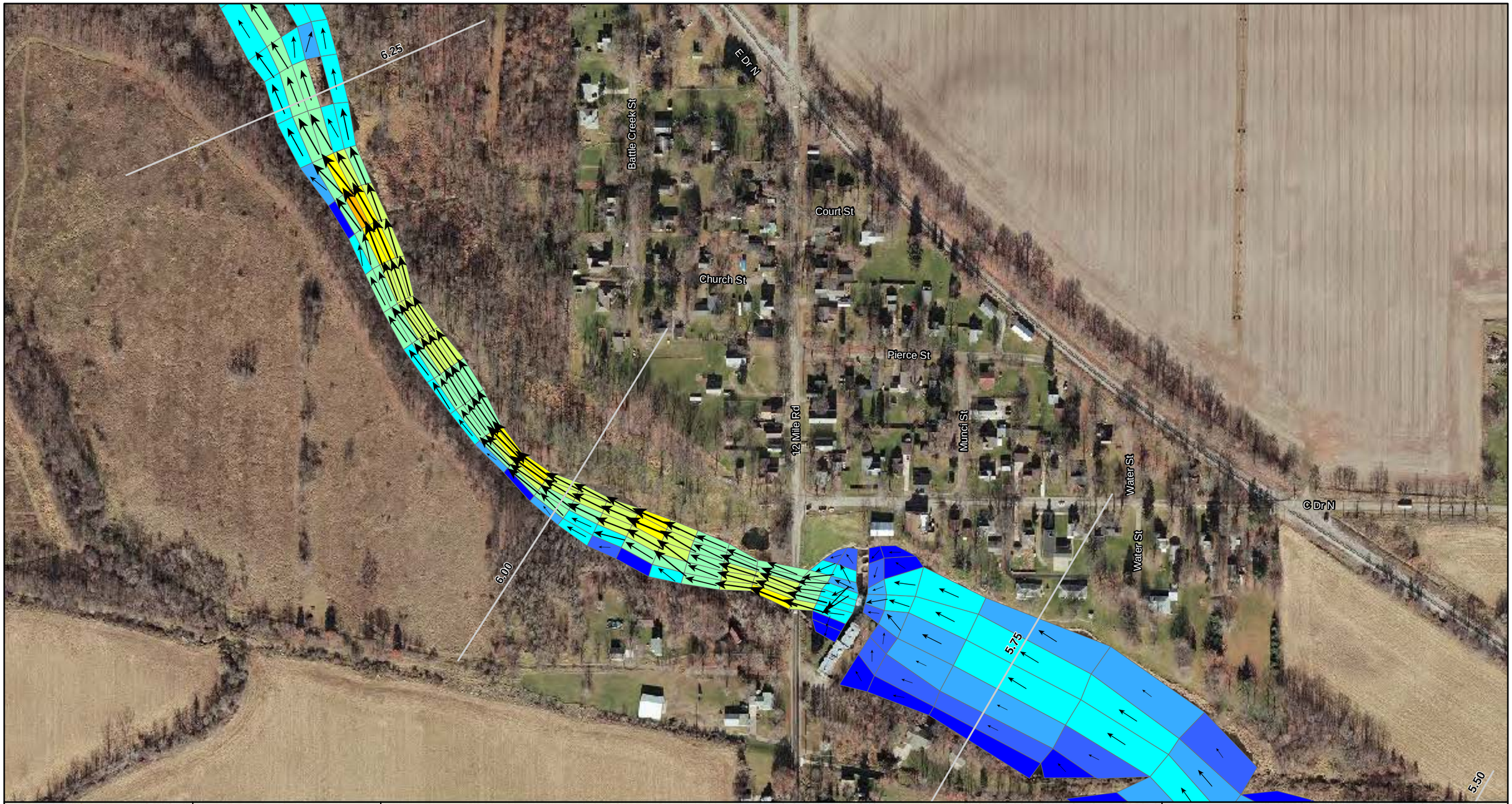
MP 04.90 - MP 05.65

SHEET 5 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

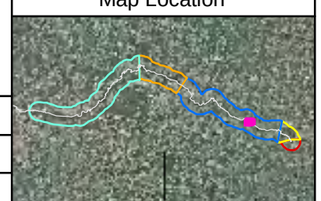
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
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- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

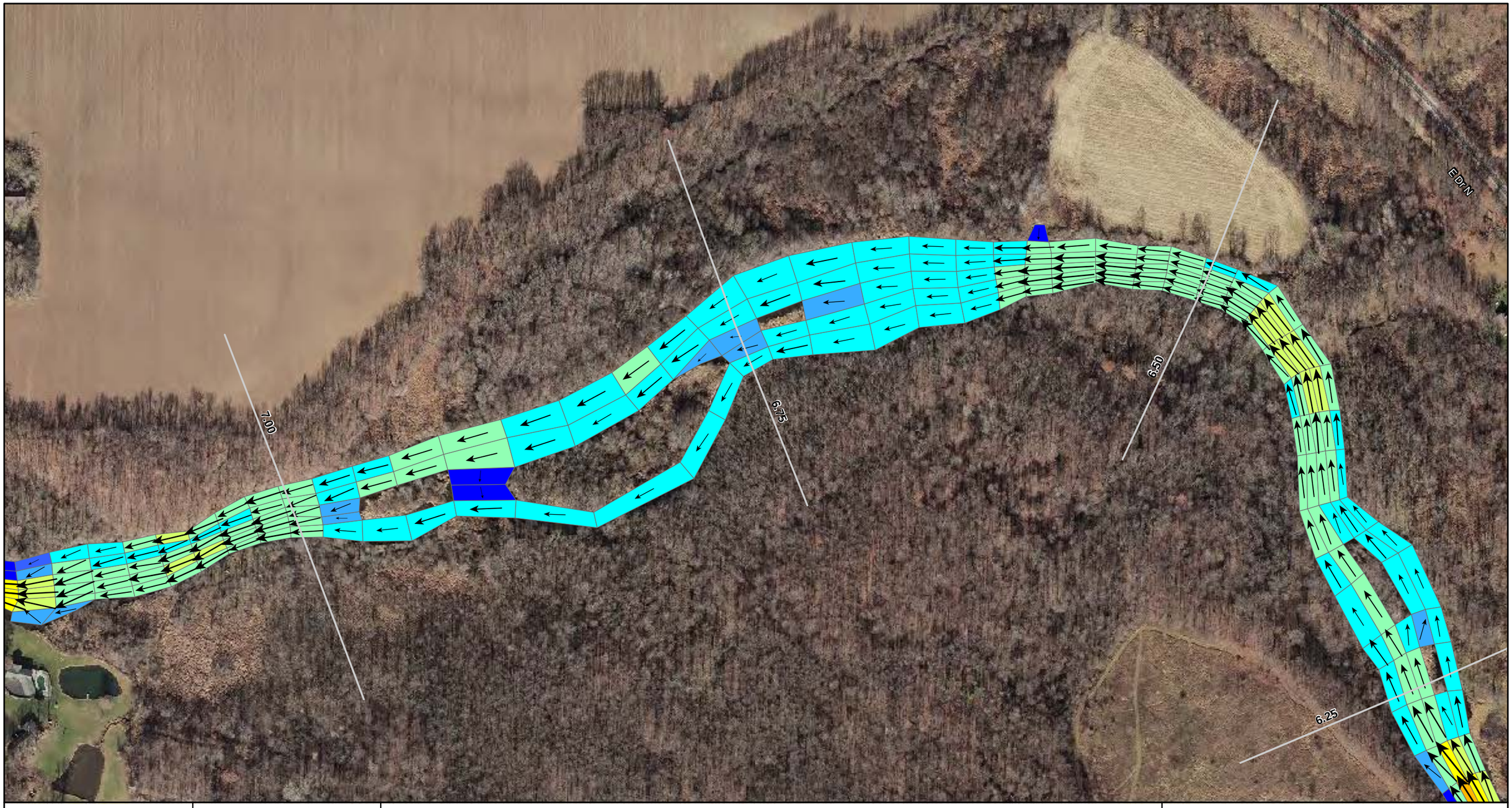
MP 05.65 - MP 06.30

SHEET 6 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

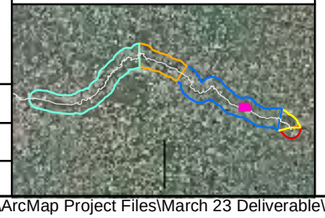
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

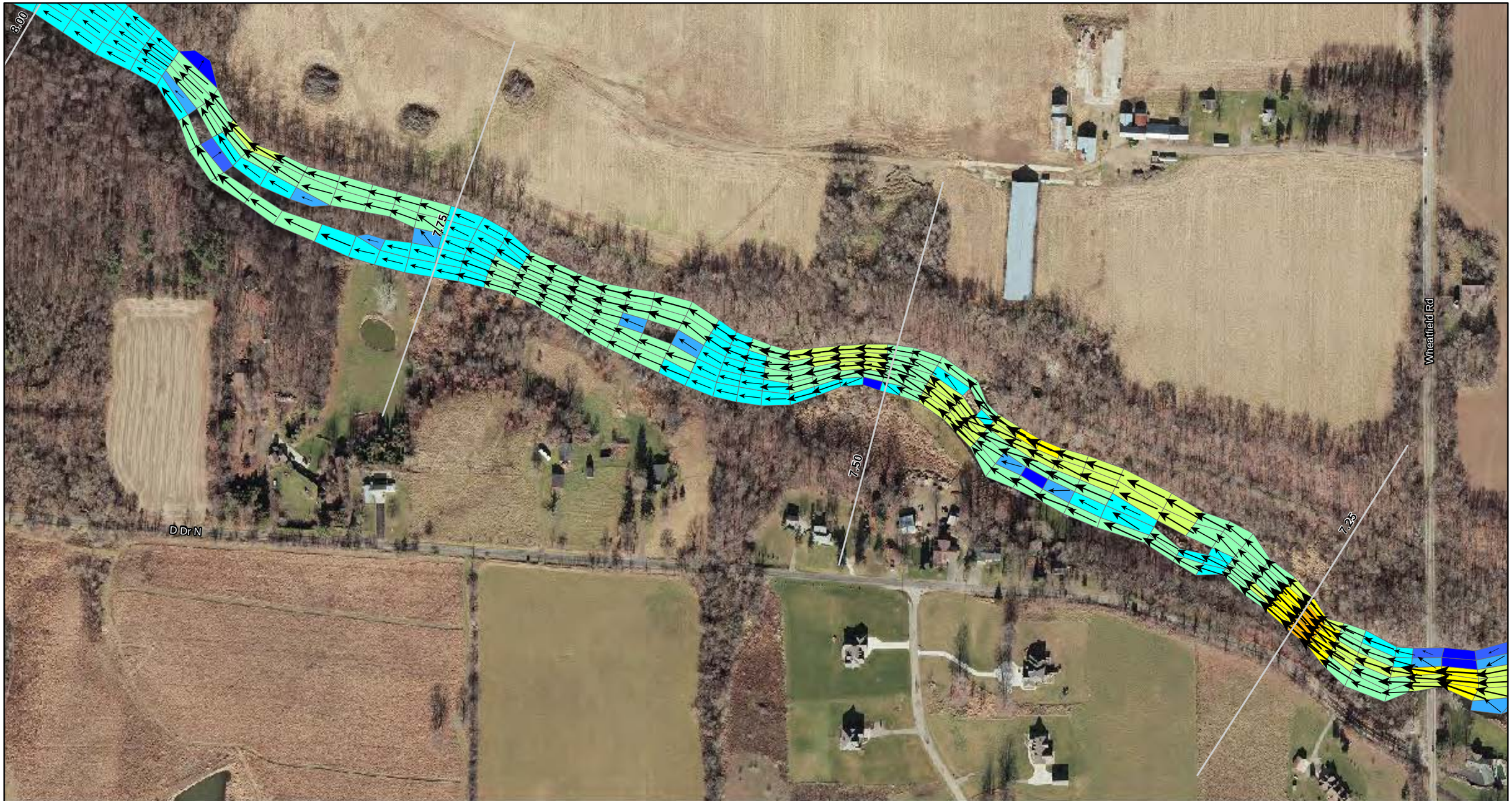
MP 06.20 - MP 07.15

SHEET 7 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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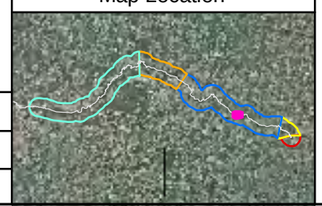
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

MP 07.15 - MP 07.95

SHEET 8 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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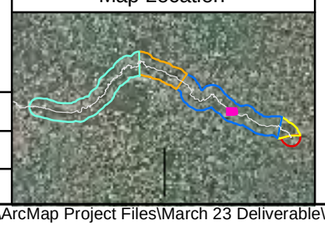
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
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- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

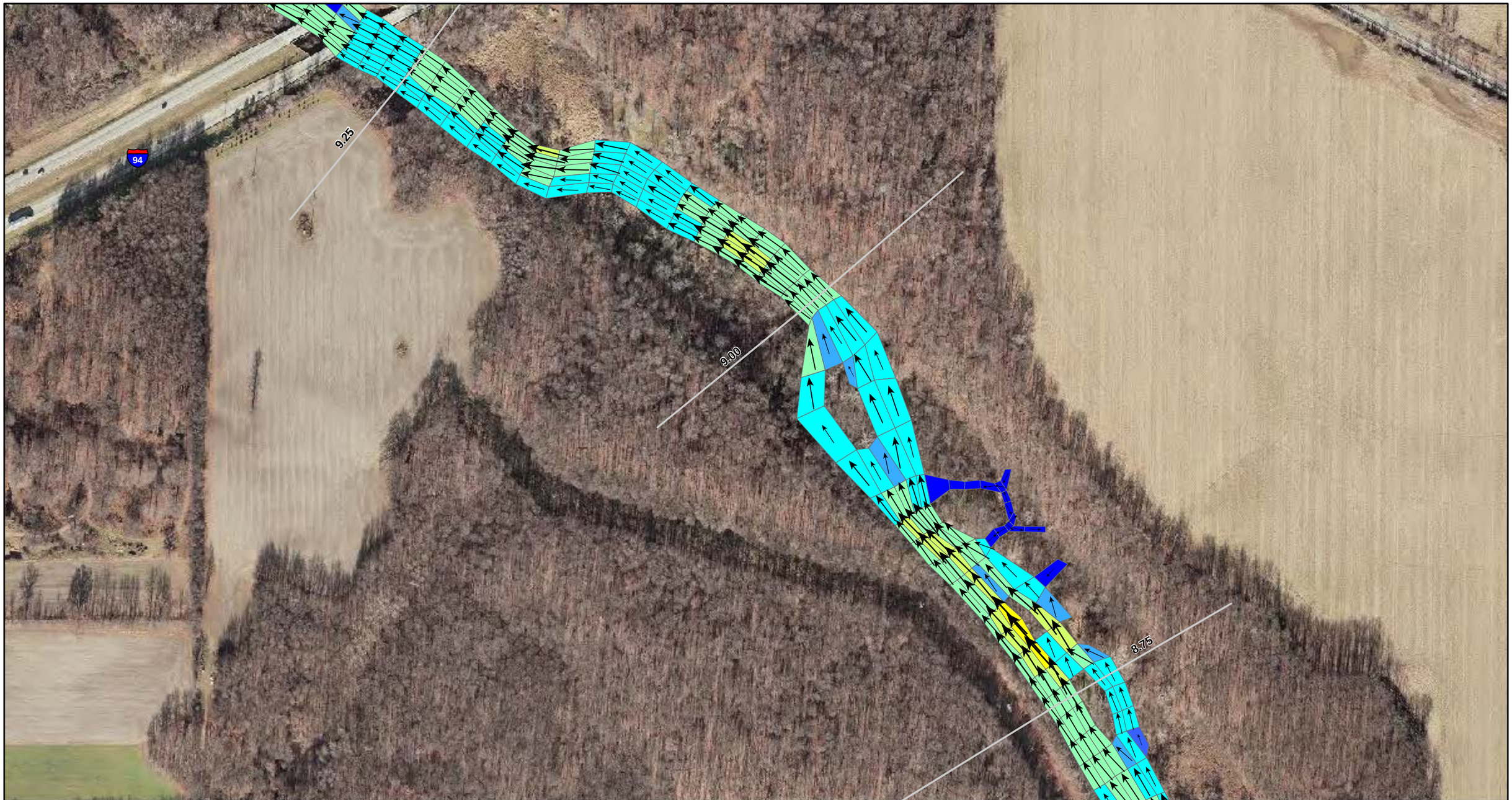
MP 07.90 - MP 08.75

SHEET 9 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

MP 08.70 - MP 09.30

SHEET 10 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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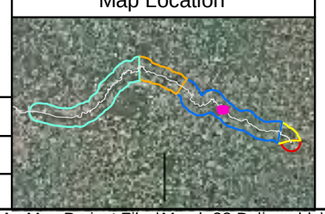
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

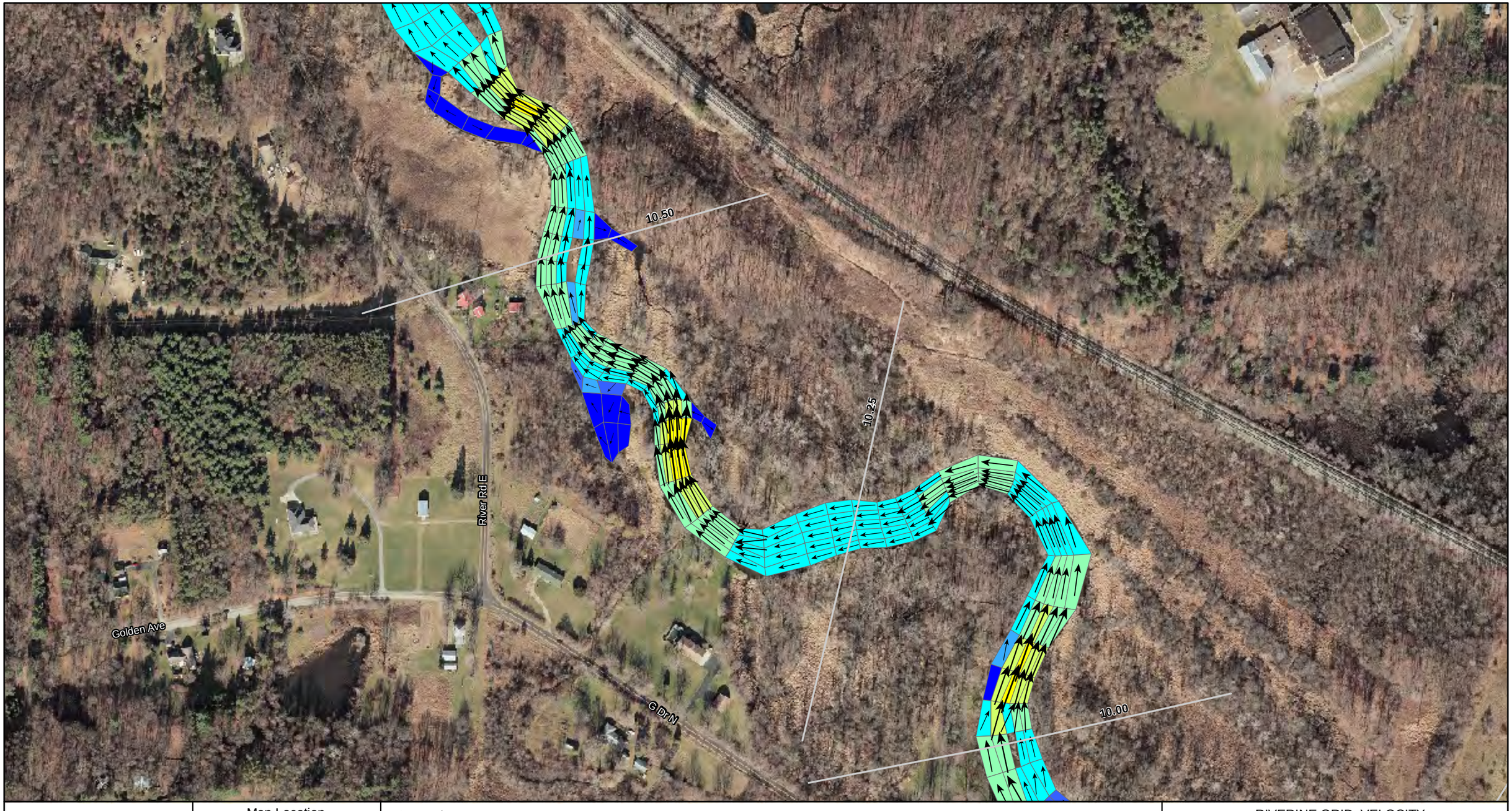
MP 09.25 - MP 10.05

SHEET 11 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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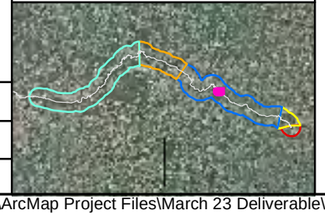
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

MP 10.00 - MP 10.65

SHEET 12 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

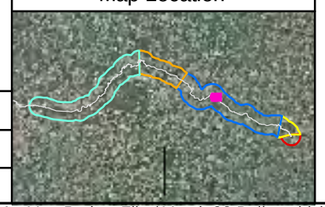
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Aerial Photography Date: November 2011



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

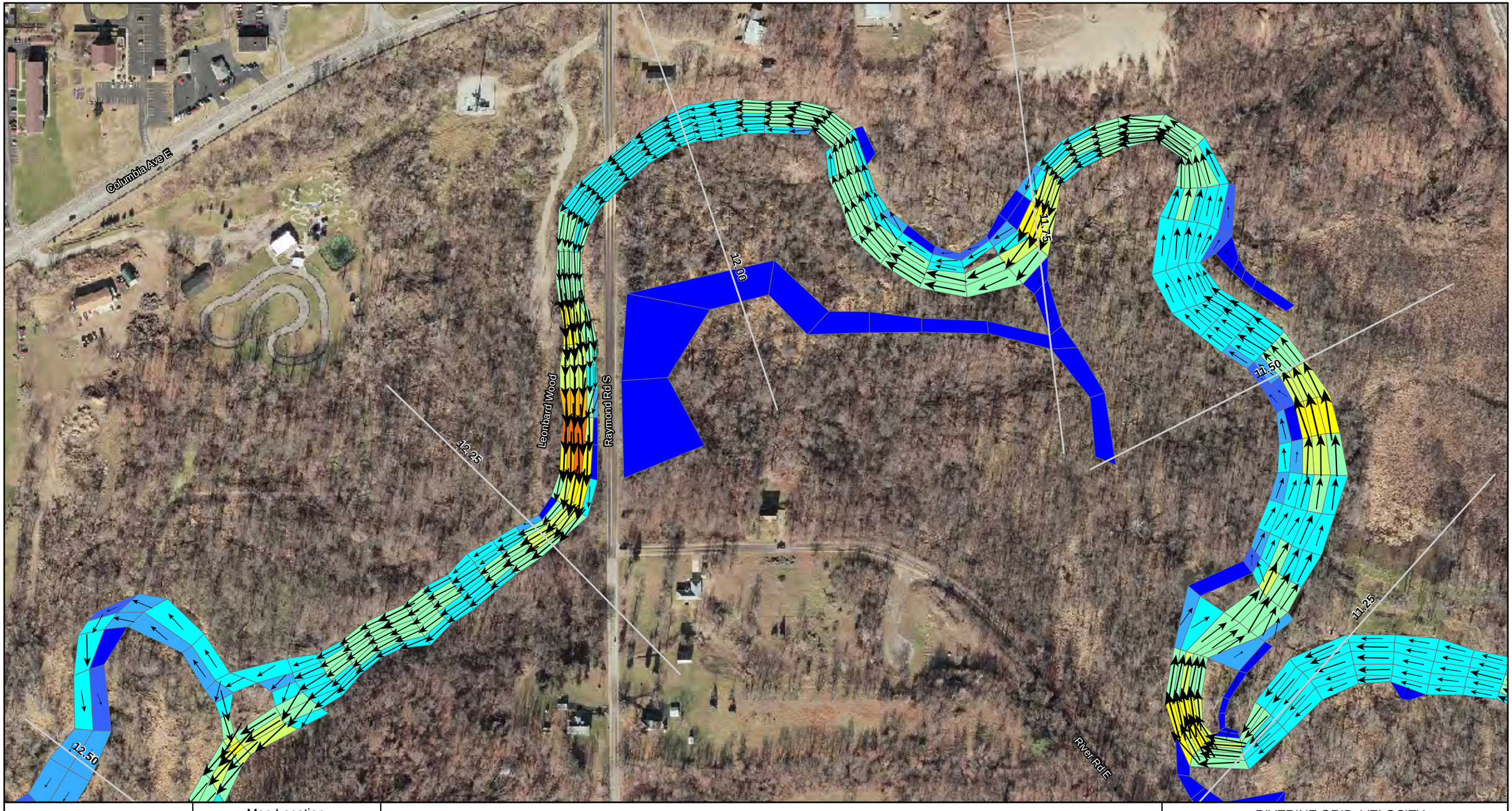
MP 10.60 - MP 11.40

SHEET 13 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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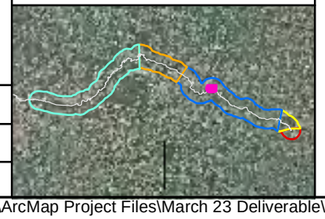
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
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- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

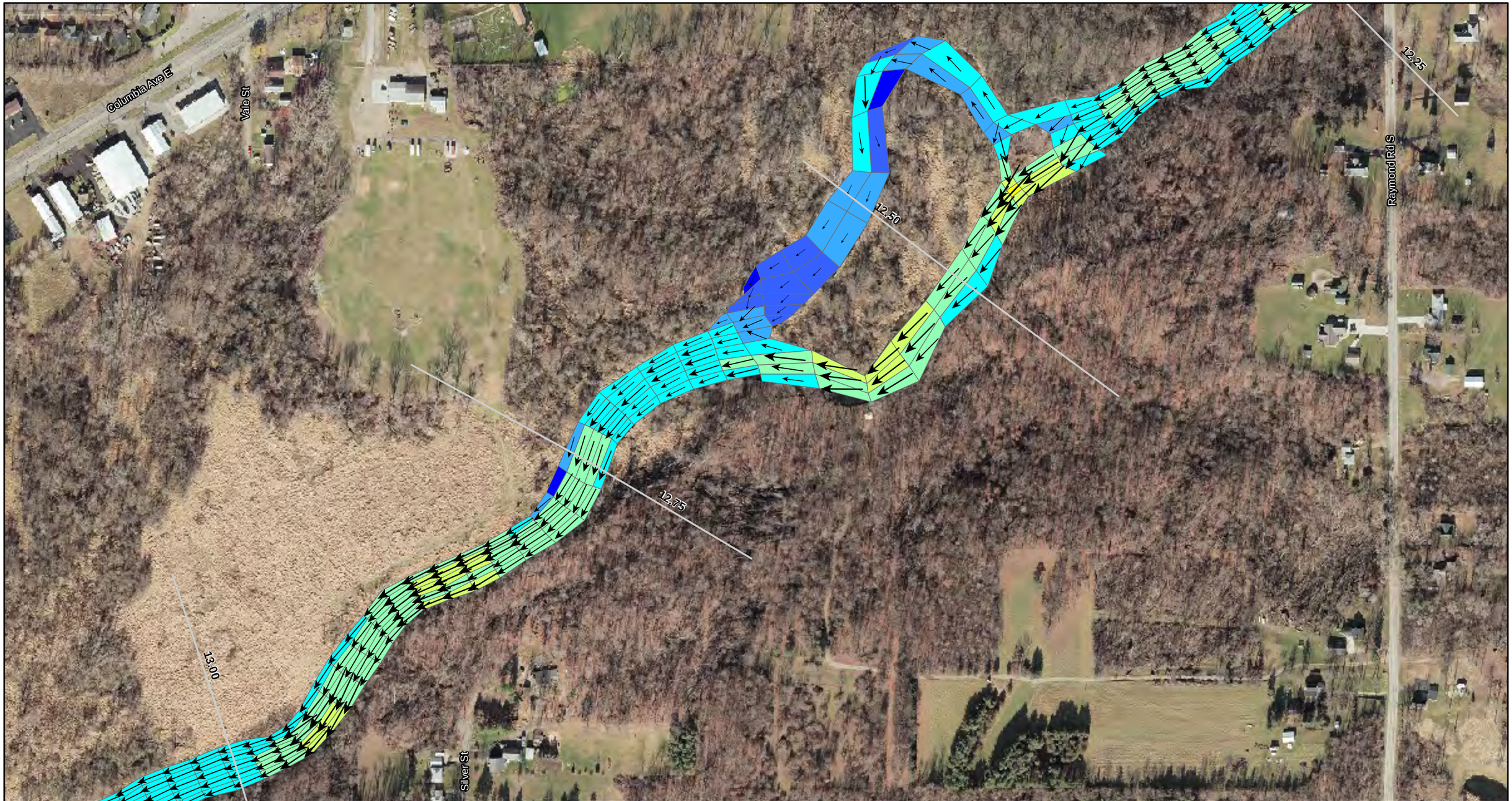
MP 11.10 - MP 12.45

SHEET 14 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

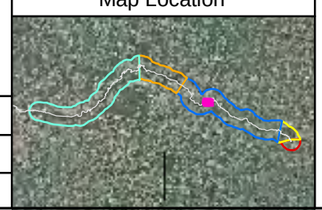
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
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- 0.5 - 1.0 ft/sec
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- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

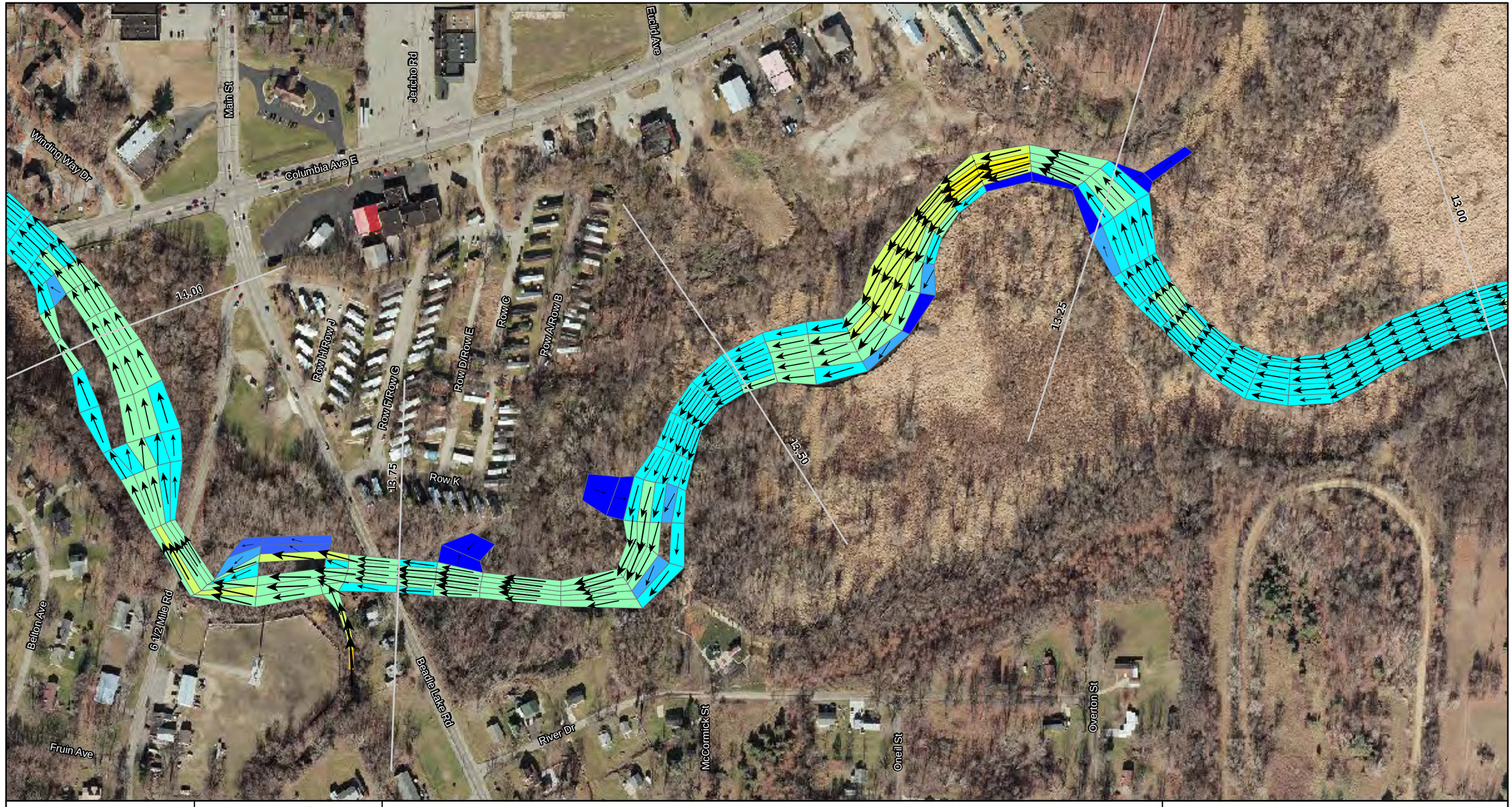
MP 12.30 - MP 13.05

SHEET 15 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

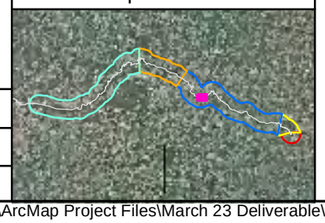
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
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- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

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0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

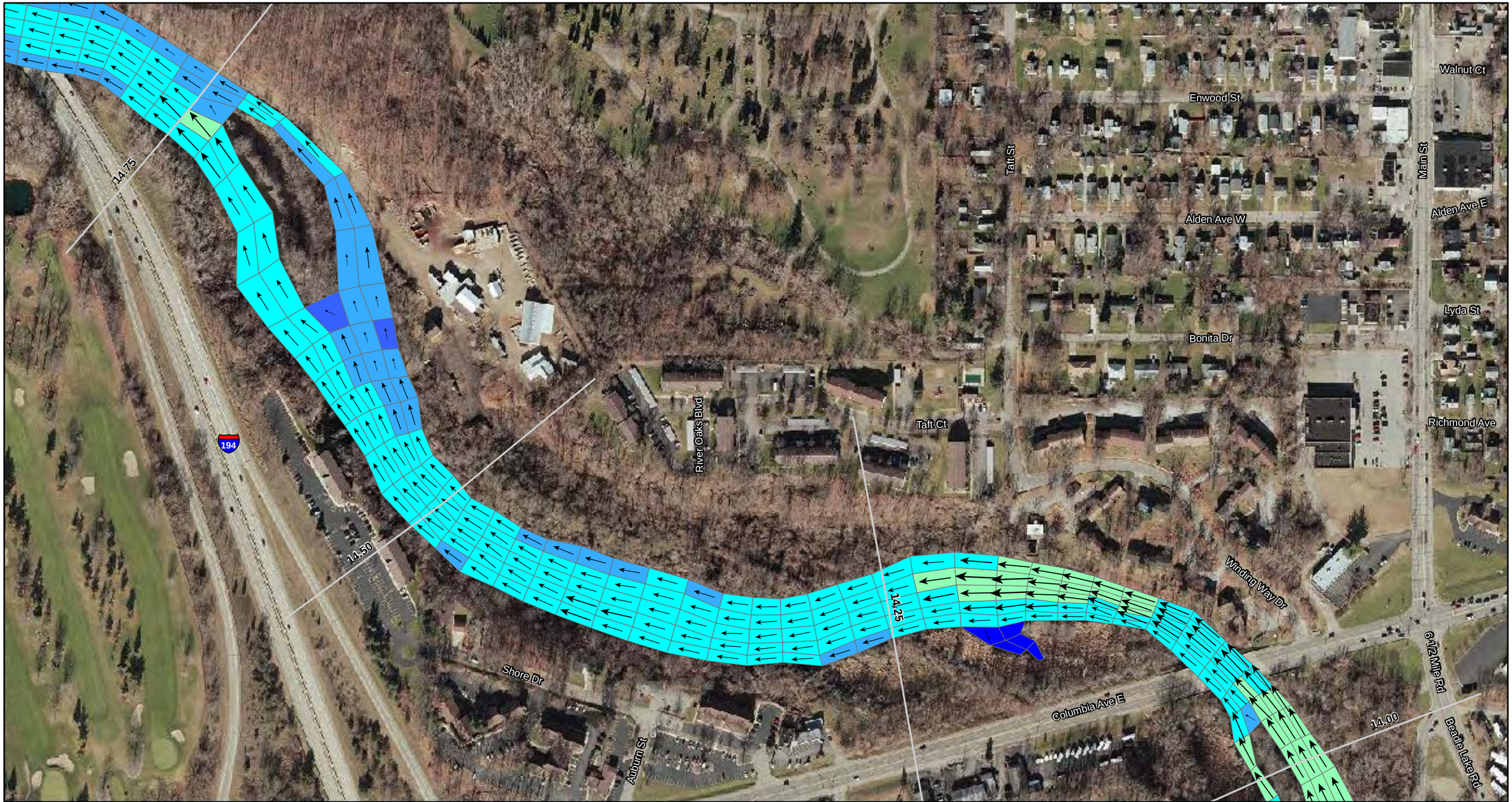
MP 13.00 - MP 14.10

SHEET 16 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

Aerial Photography Date: November 2011



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

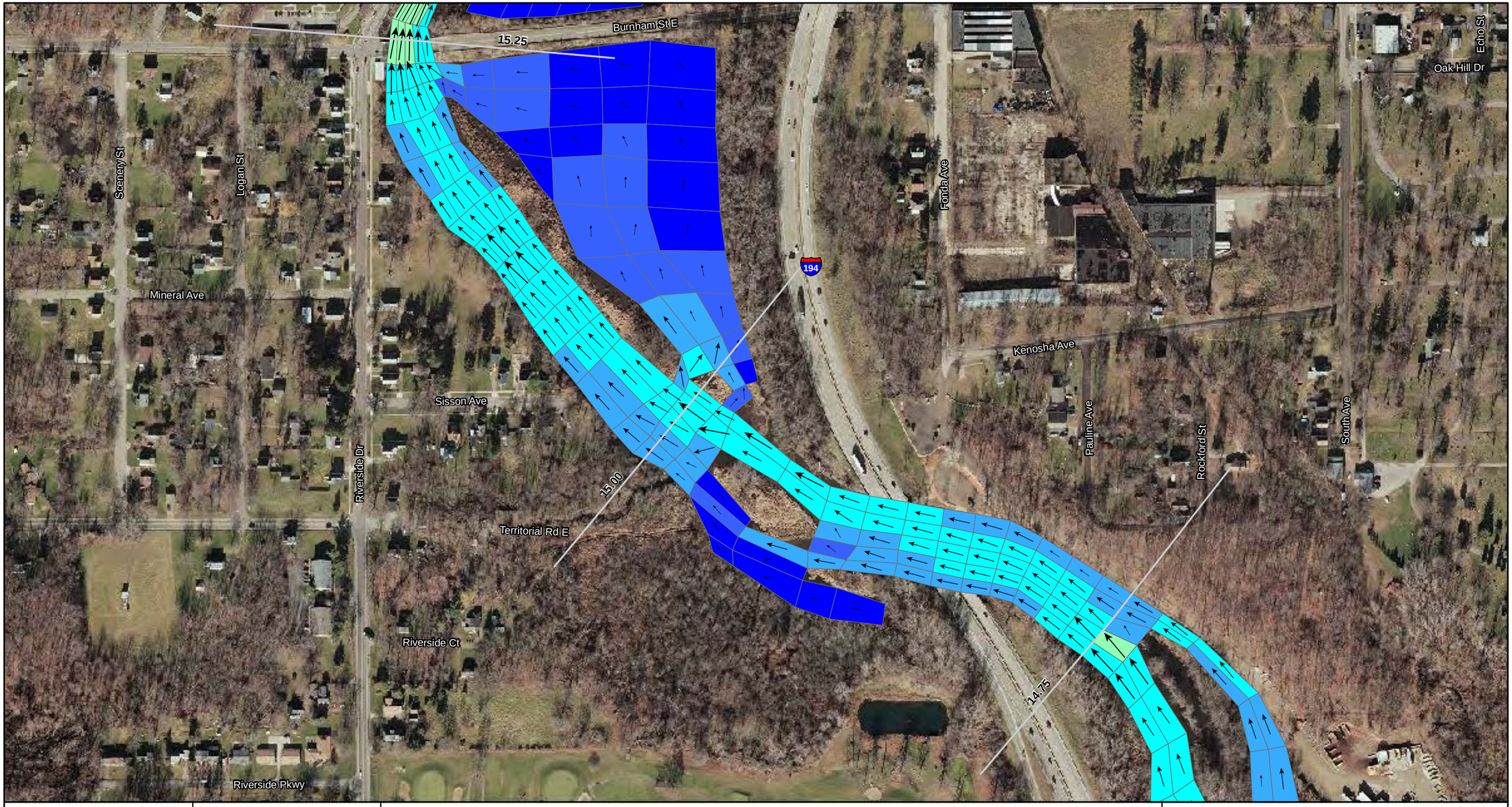
MP 14.00 - MP 14.85

SHEET 17 OF 56

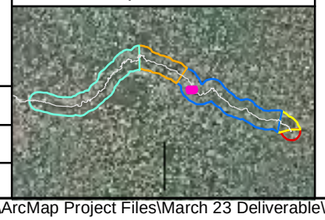
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

Aerial Photography Date: November 2011



Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

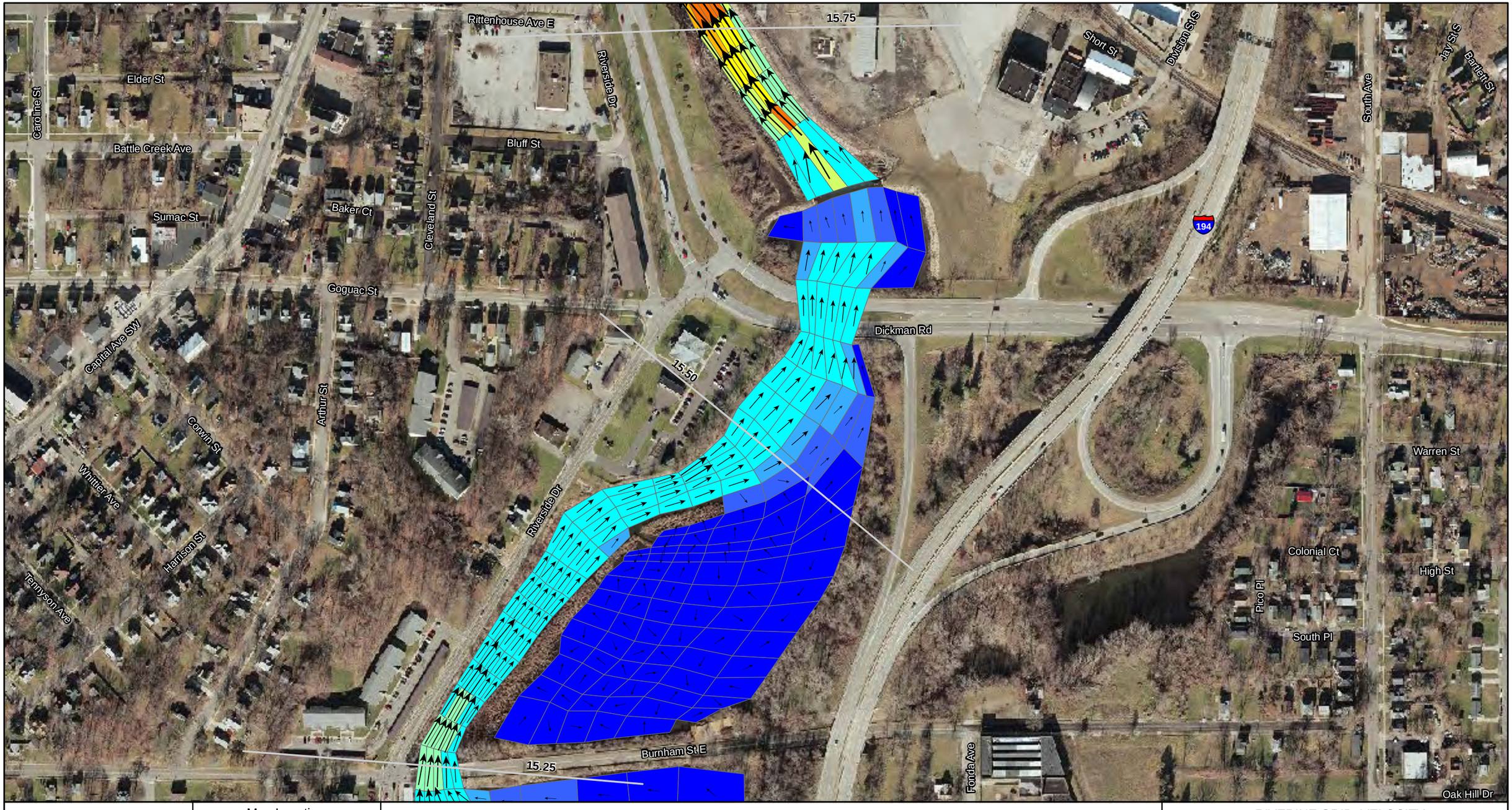
MP 14.65 - MP 15.25

SHEET 18 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

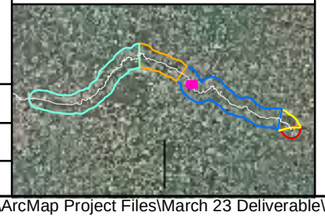
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

MP 15.25 - MP 15.75

SHEET 19 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

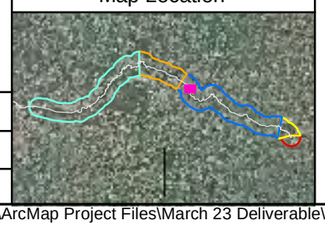
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

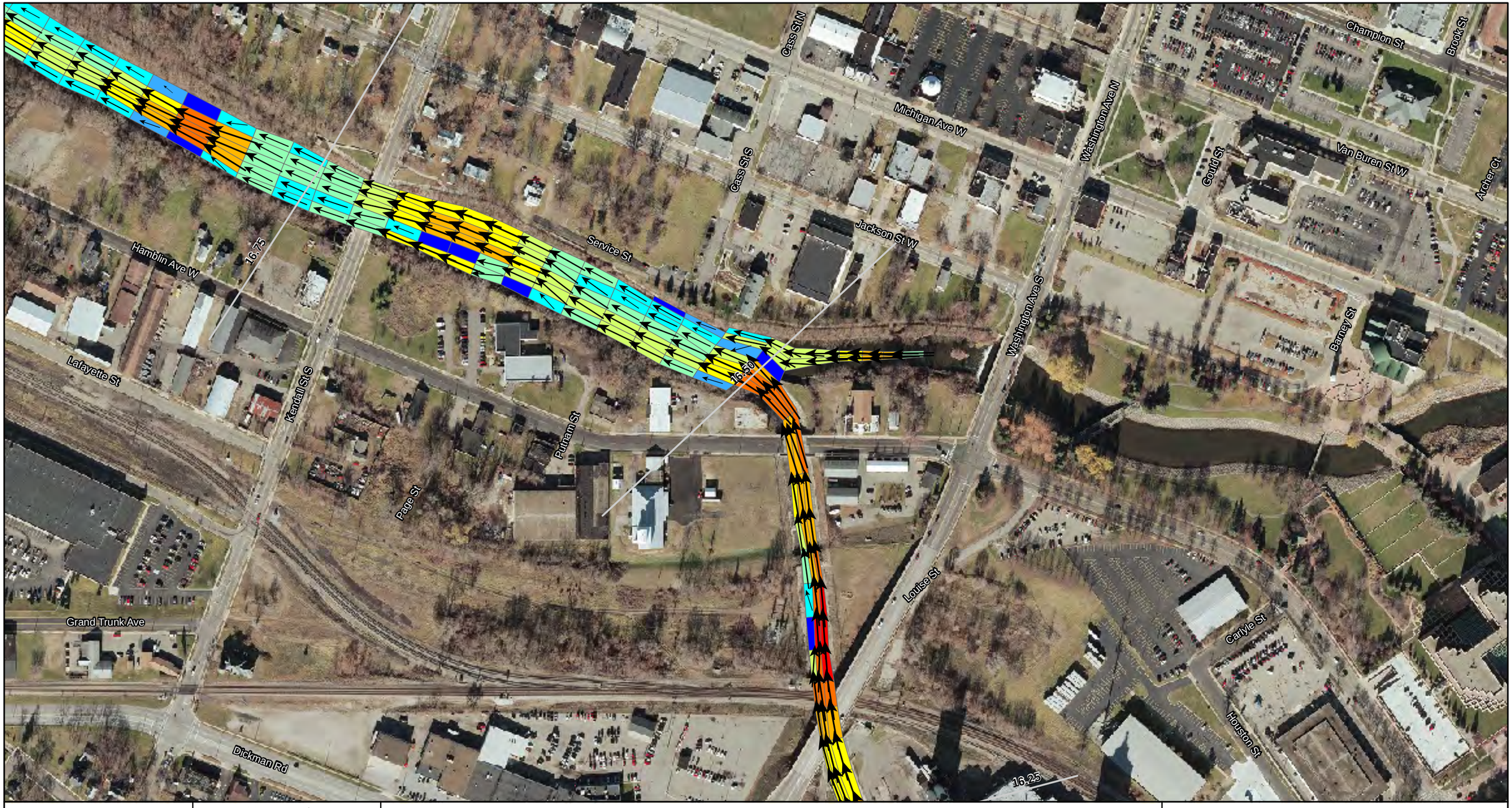
MP 15.75 - MP 16.30

SHEET 20 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

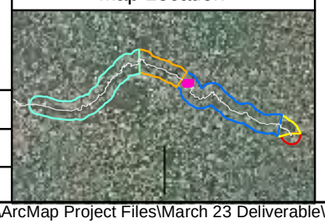
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

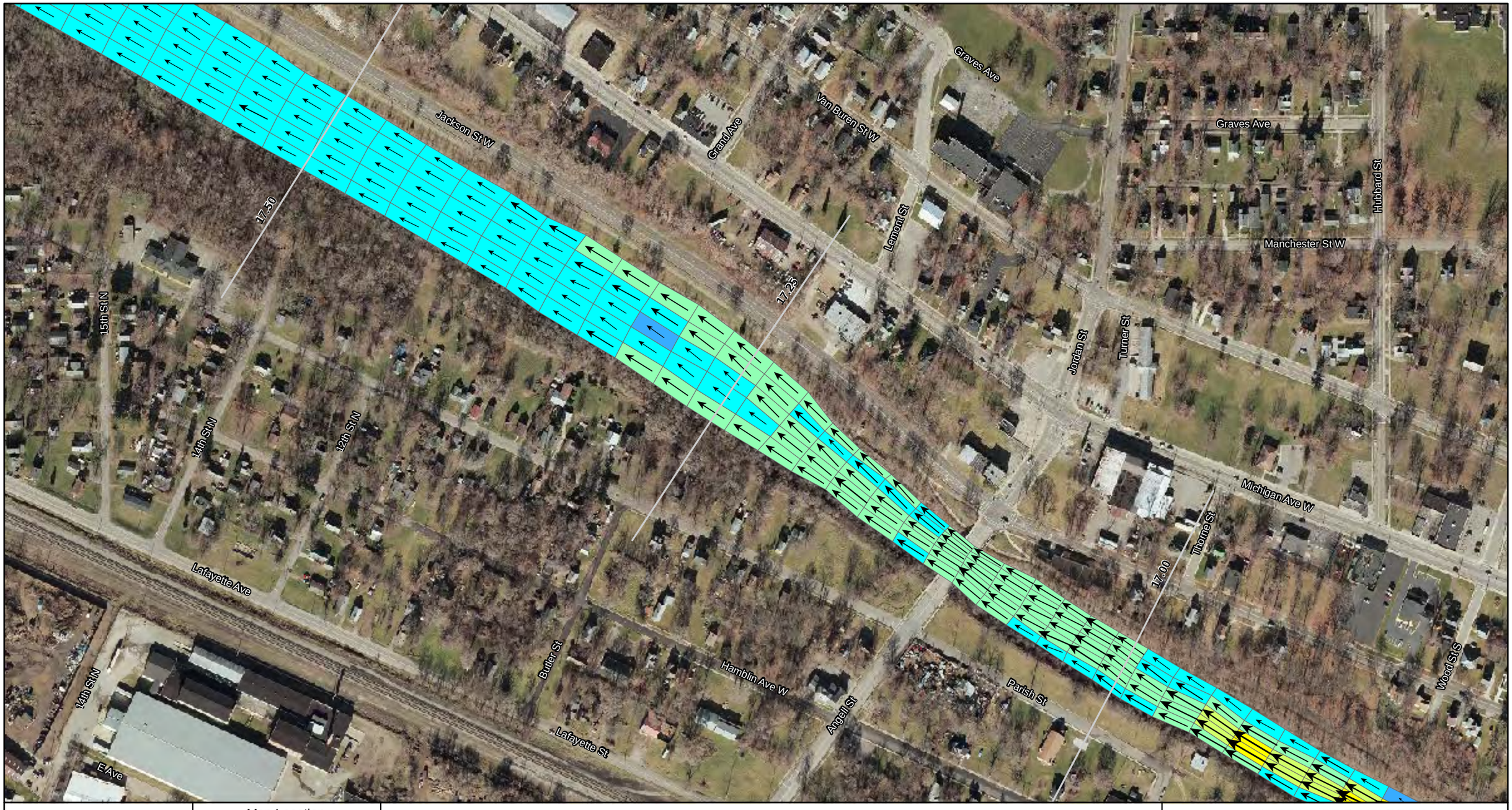
MP 16.30 - MP 16.95

SHEET 21 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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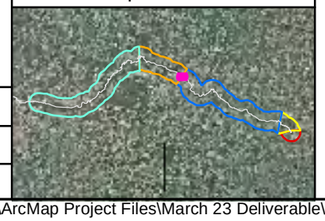
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

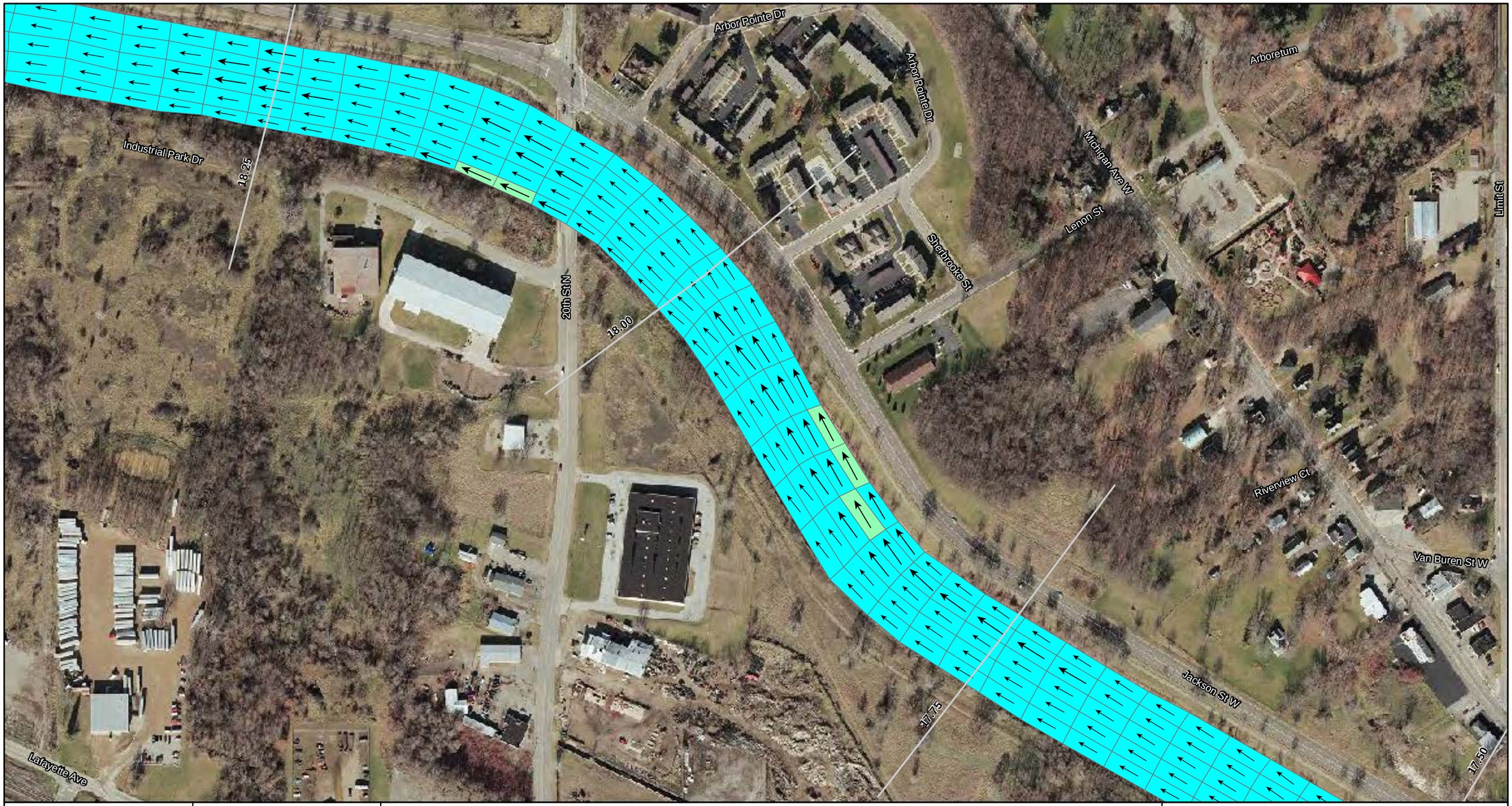
MP 16.85 - MP 17.60

SHEET 22 OF 56

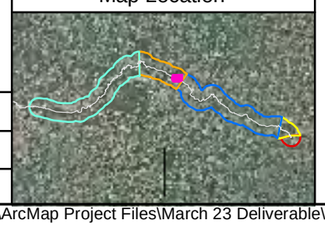
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

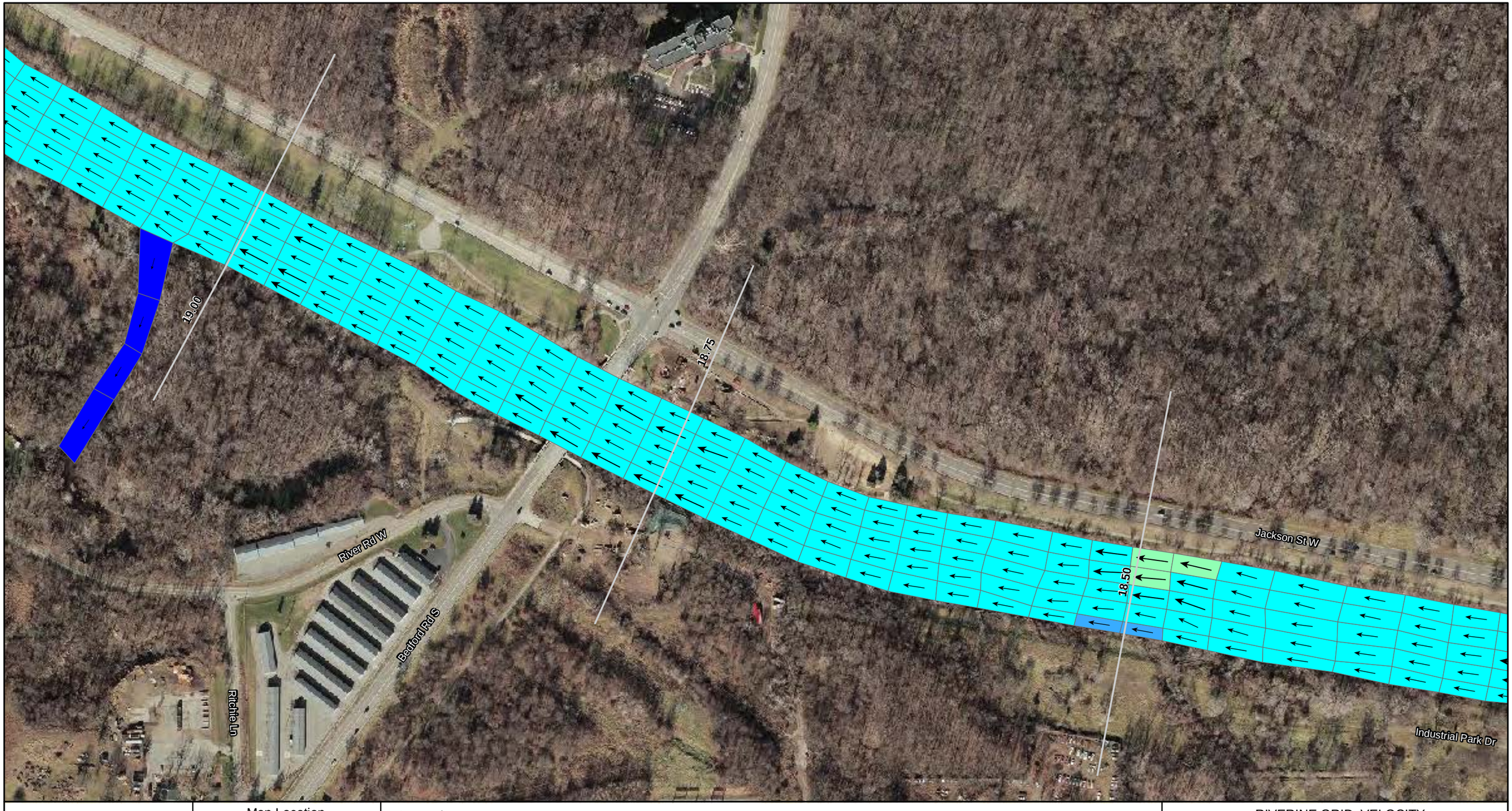
MP 17.60 - MP 18.40

SHEET 23 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

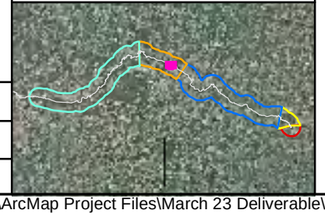
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

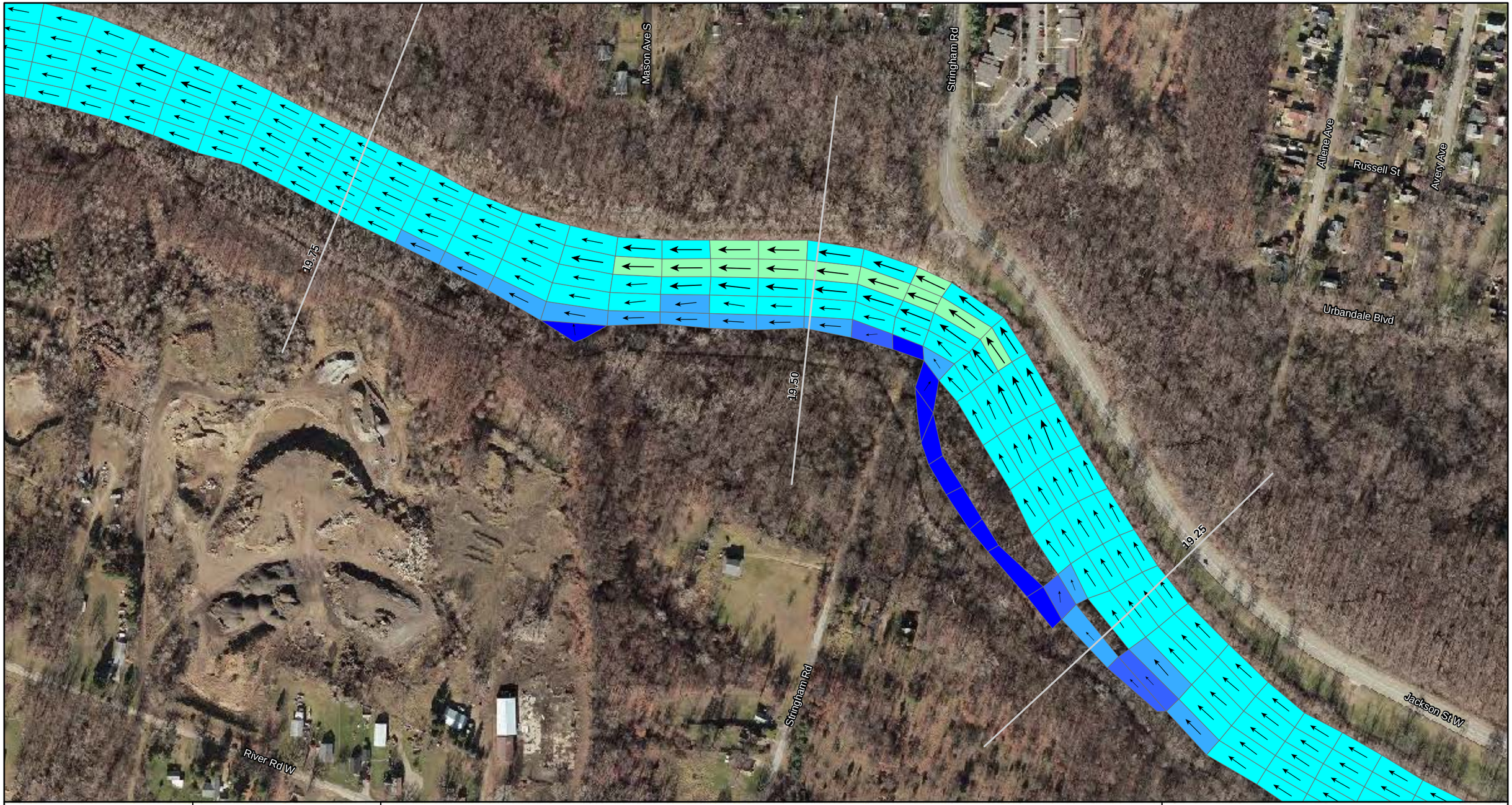
MP 18.30 - MP 19.15

SHEET 24 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

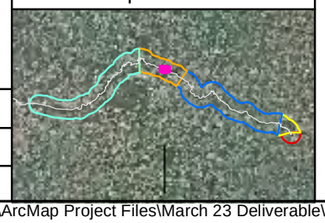
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

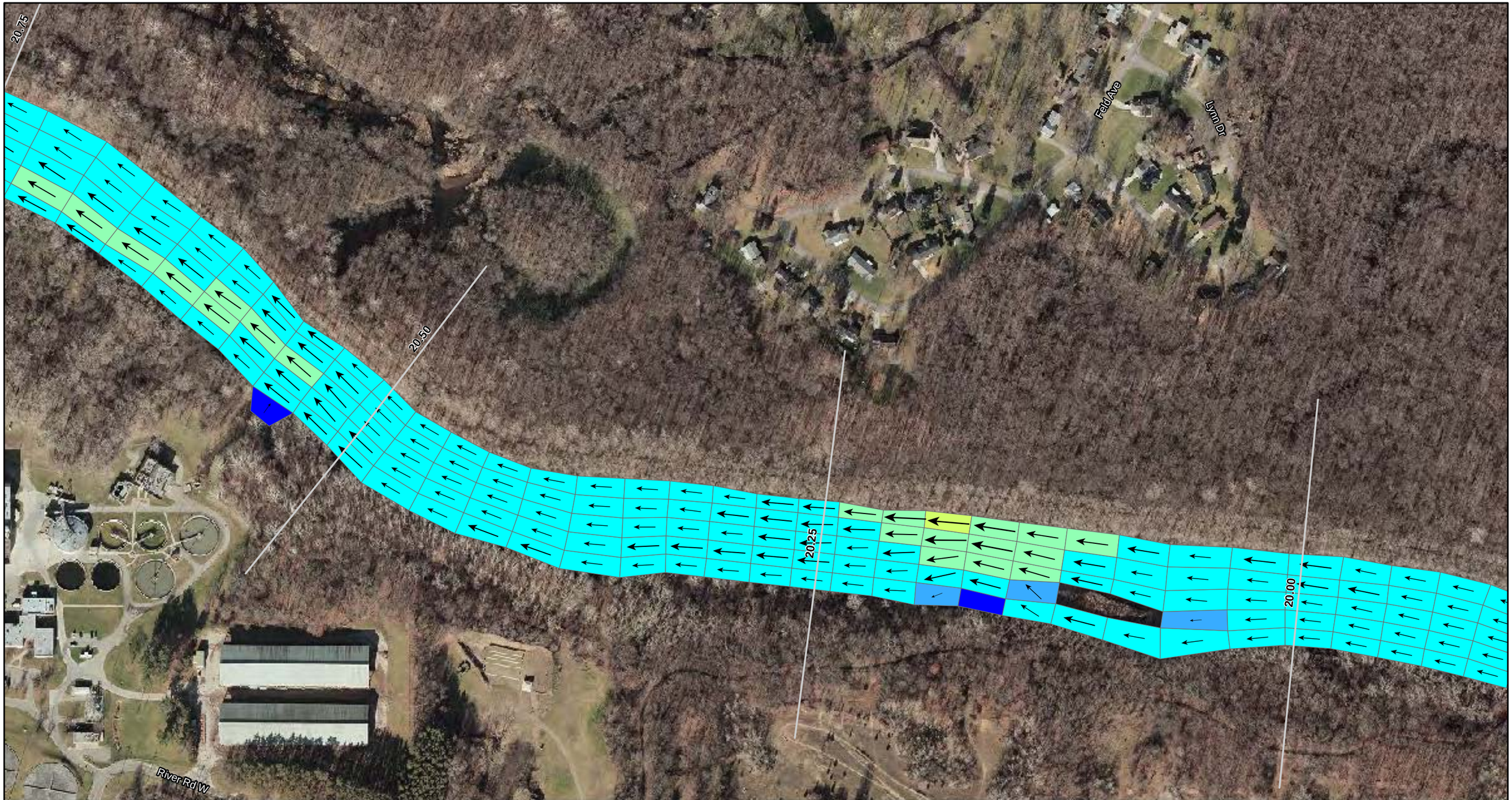
MP 19.10 - MP 19.95

SHEET 25 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

MP 19.90 - MP 20.75

SHEET 26 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

Coldwater Ave

Custer Dr

Stillson Blvd

21.25

21.00

20.75

ENBRIDGE	
Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

MP 20.70 - MP 21.50

SHEET 27 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

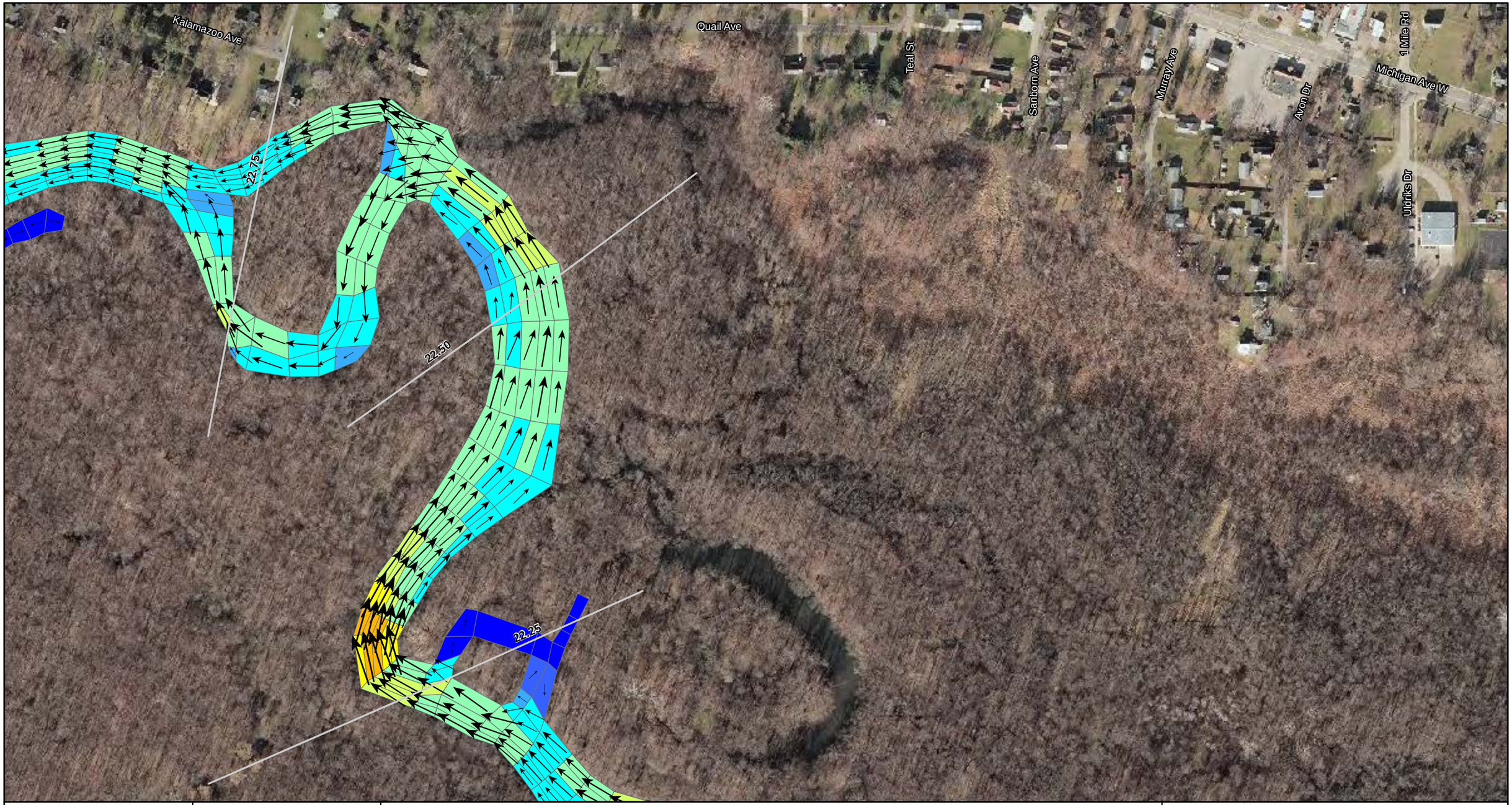
MP 21.35 - MP 22.15

SHEET 28 OF 56

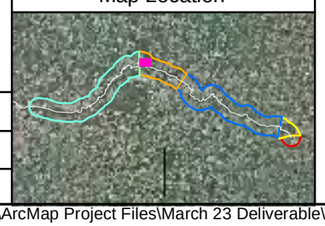
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

Aerial Photography Date: November 2011



Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

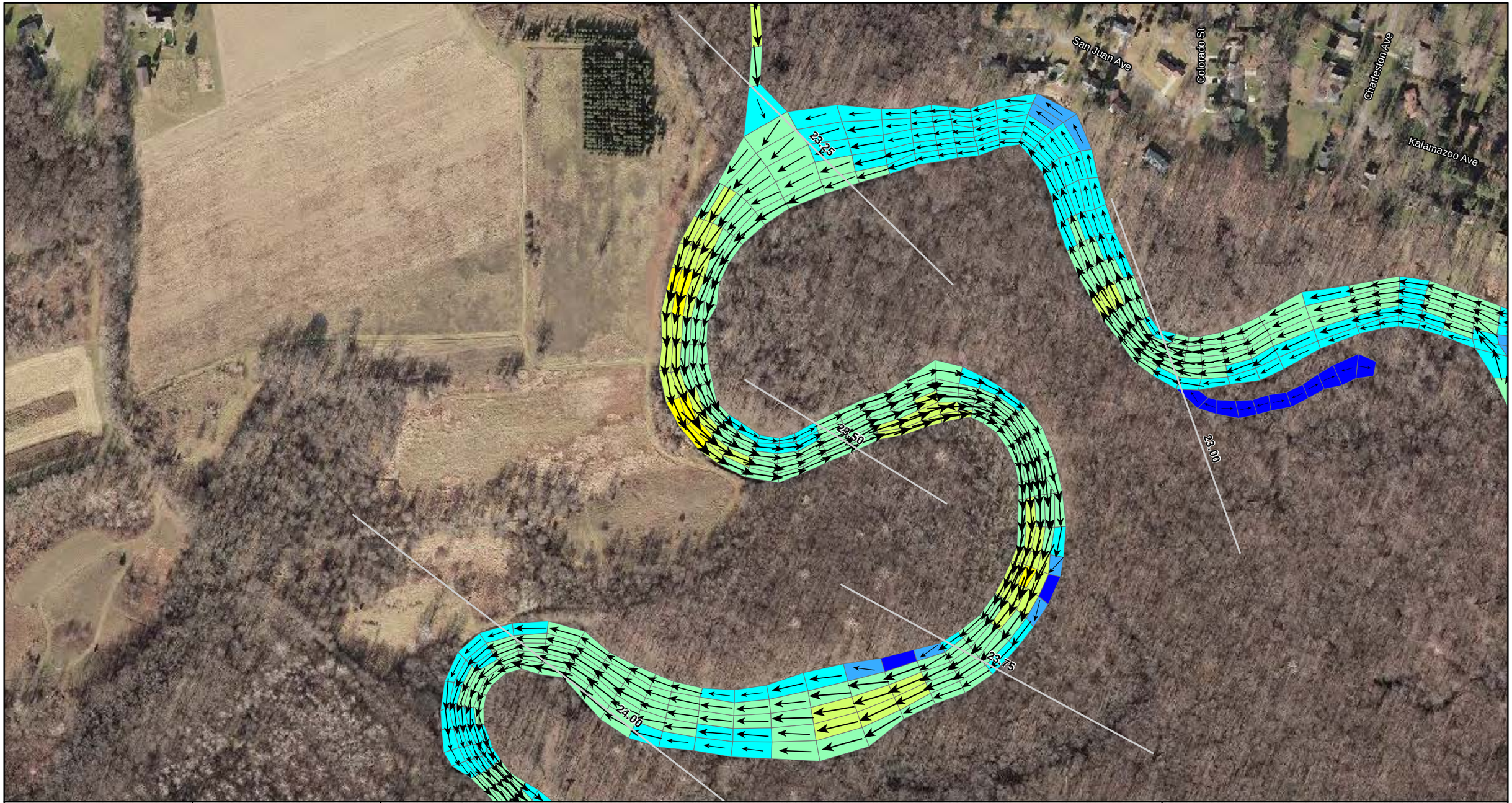
MP 22.15 - MP 22.90

SHEET 29 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

MP 22.80 - MP 24.10

SHEET 30 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

24.00
24.25
24.50
24.75
River Rd W
Fort Custer Dr
County Line Rd

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

MP 24.10 - MP 24.85

SHEET 31 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

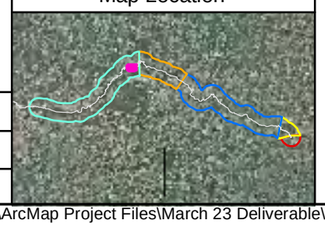
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

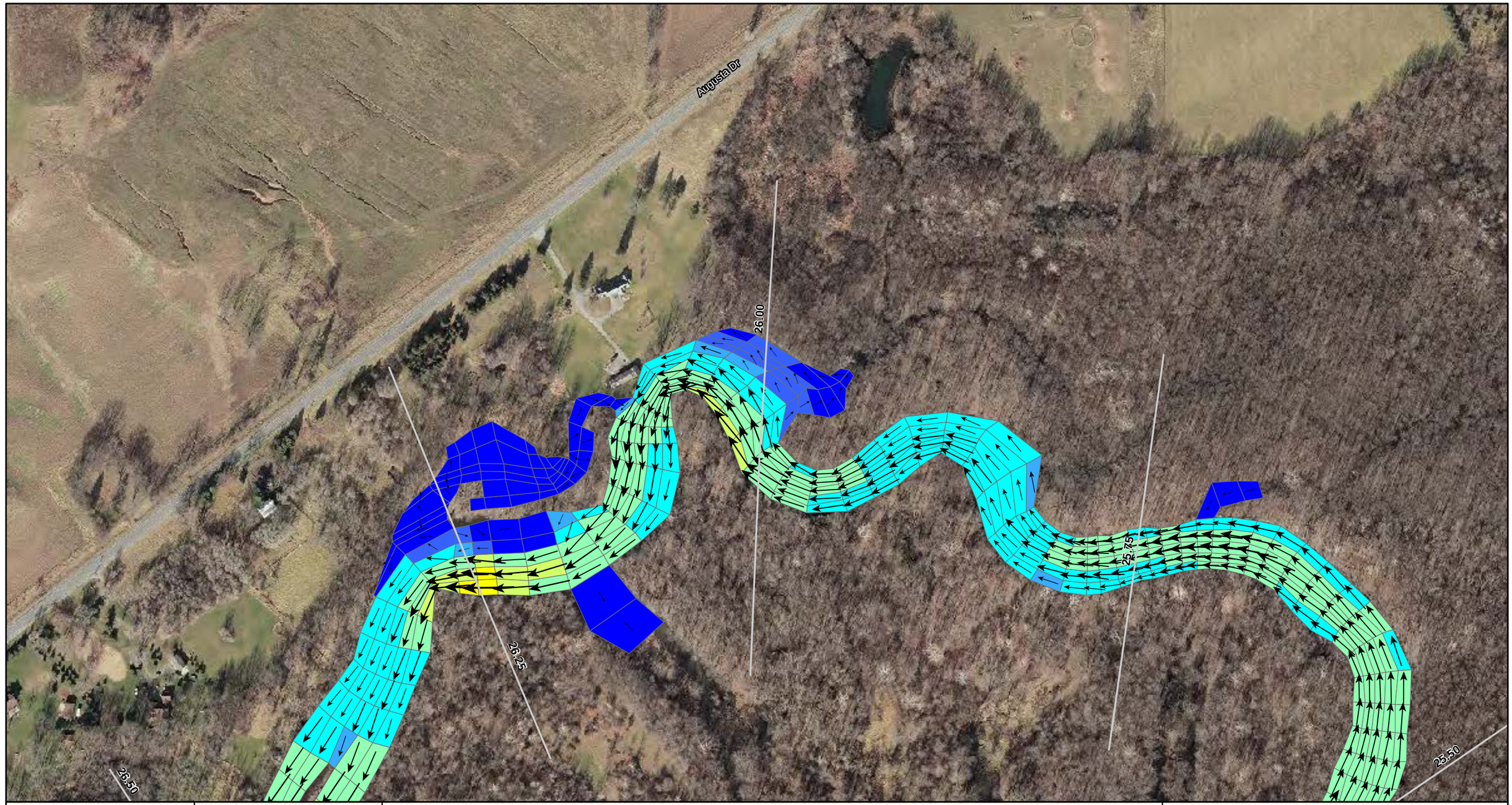
MP 24.80 - MP 25.65

SHEET 32 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

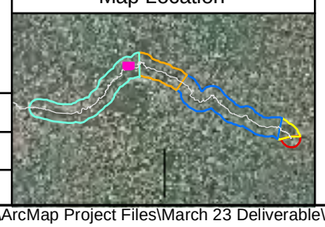
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

Aerial Photography Date: November 2011



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

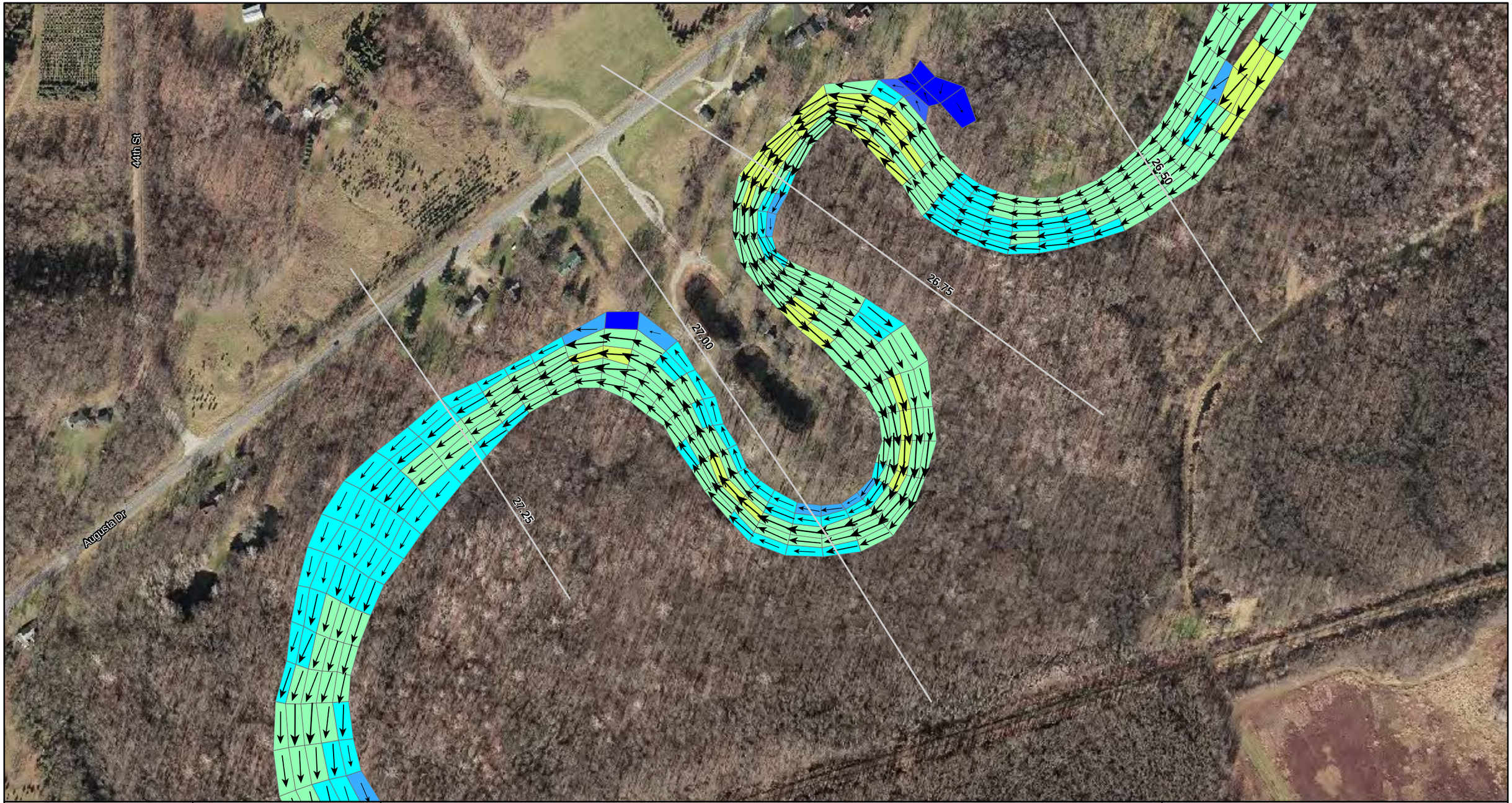
MP 25.55 - MP 26.40

SHEET 33 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

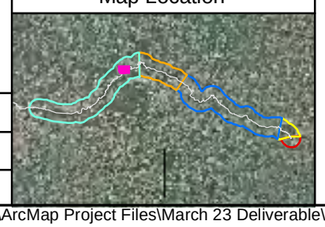
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

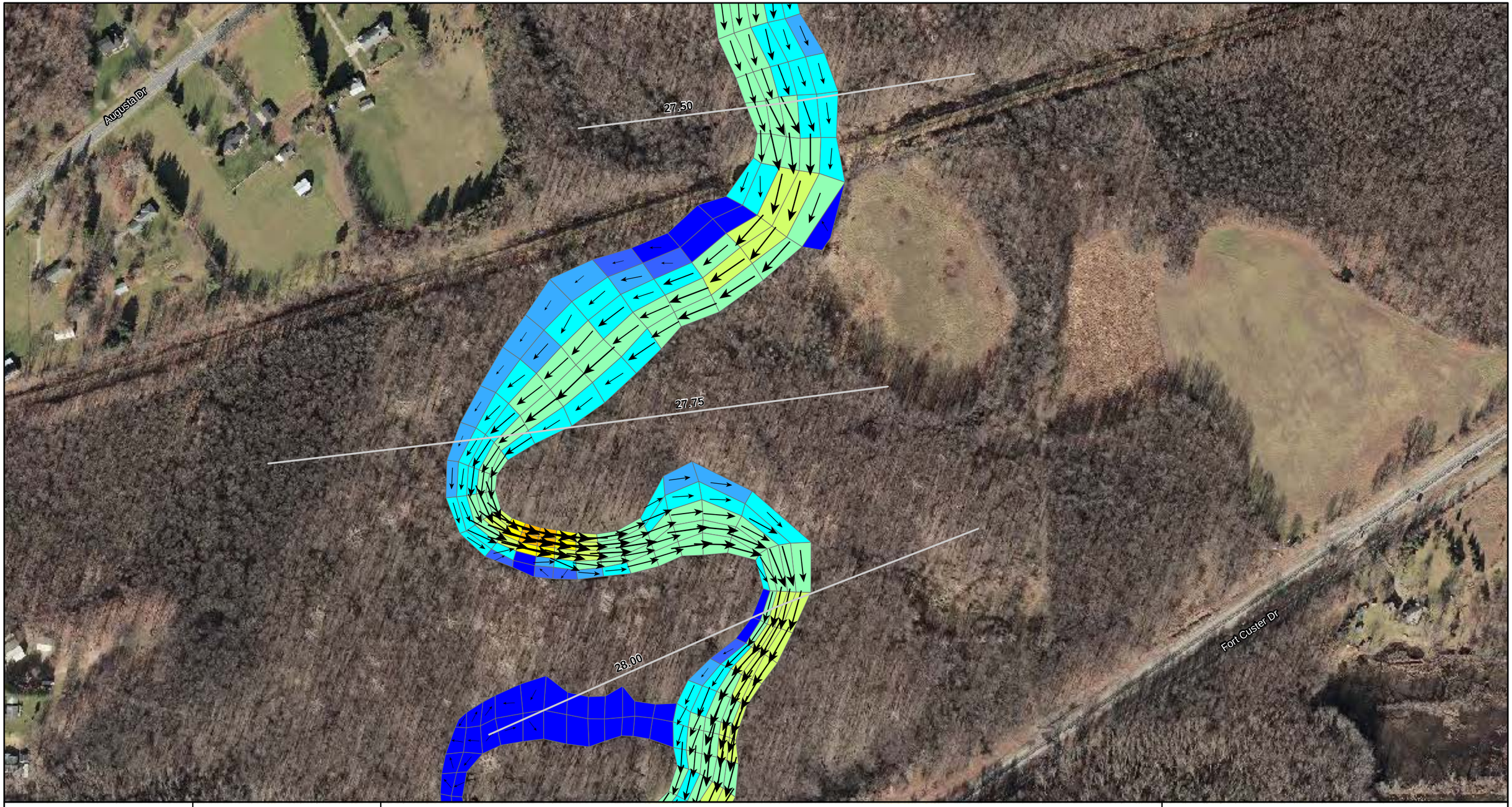
MP 26.40 - MP 27.45

SHEET 34 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

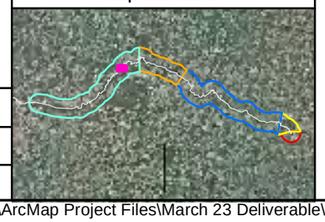
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

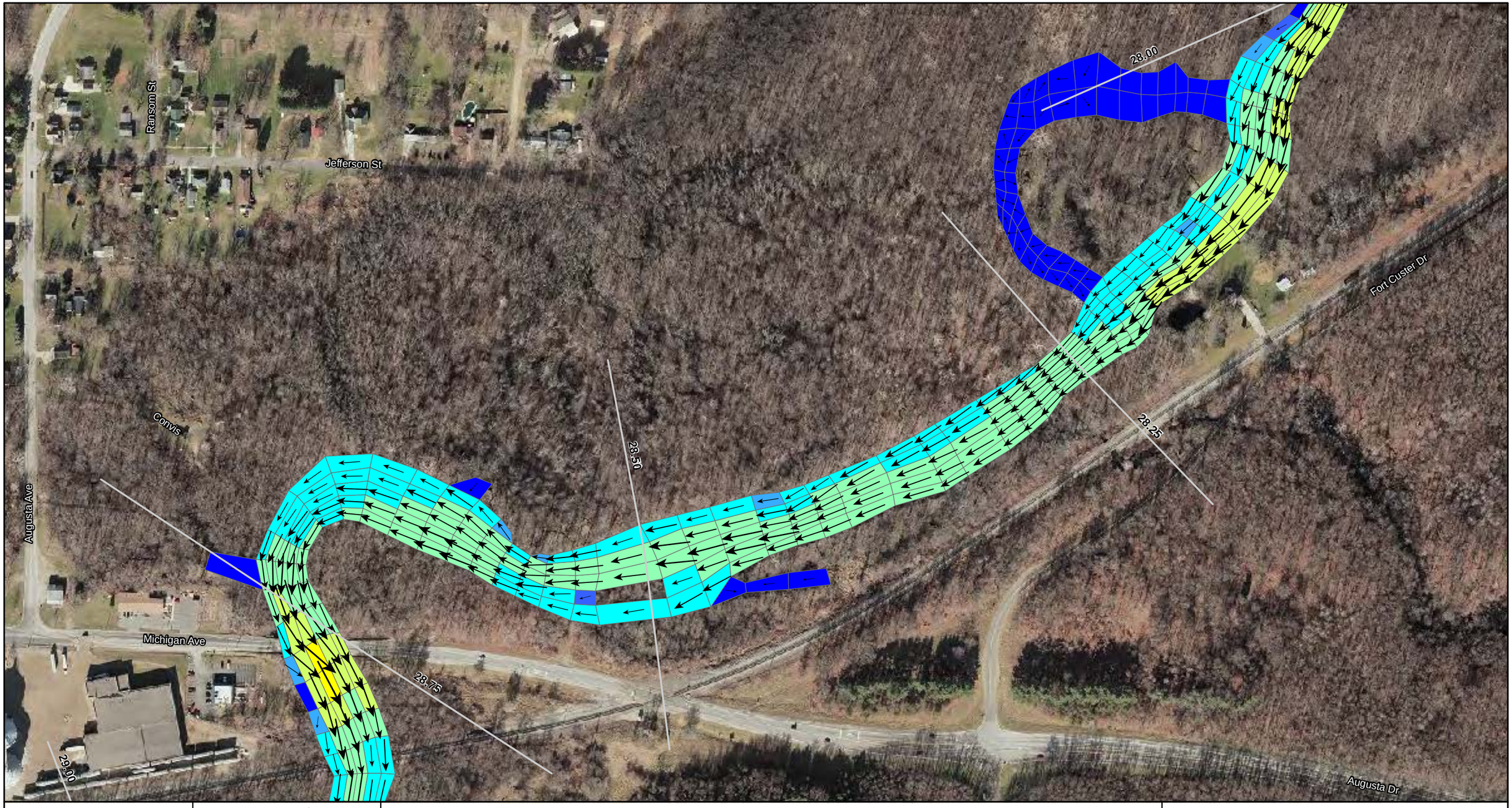
MP 27.45 - MP 28.10

SHEET 35 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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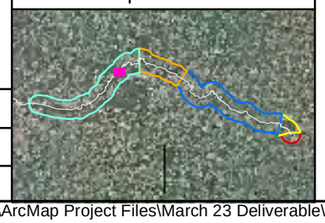
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

MP 28.05 - MP 28.85

SHEET 36 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

Clinton St
Clinton St
Chestnut St
Webster St
Church St
Fayette St
Cass St
Cherry St
Lincoln St
28.75
28.00
28.25
29.50
Augusta Climax Rd
Fort Custer Rec Area Access

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

MP 28.85 - MP29.55

SHEET 37 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

29.50

29.75

30.00

30.25

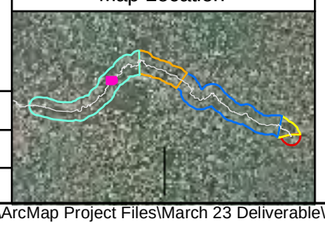
Fort Custer Rec Area Service

Fort Custer Rec Area Access

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

MP 29.50 - MP29.95

SHEET 38 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

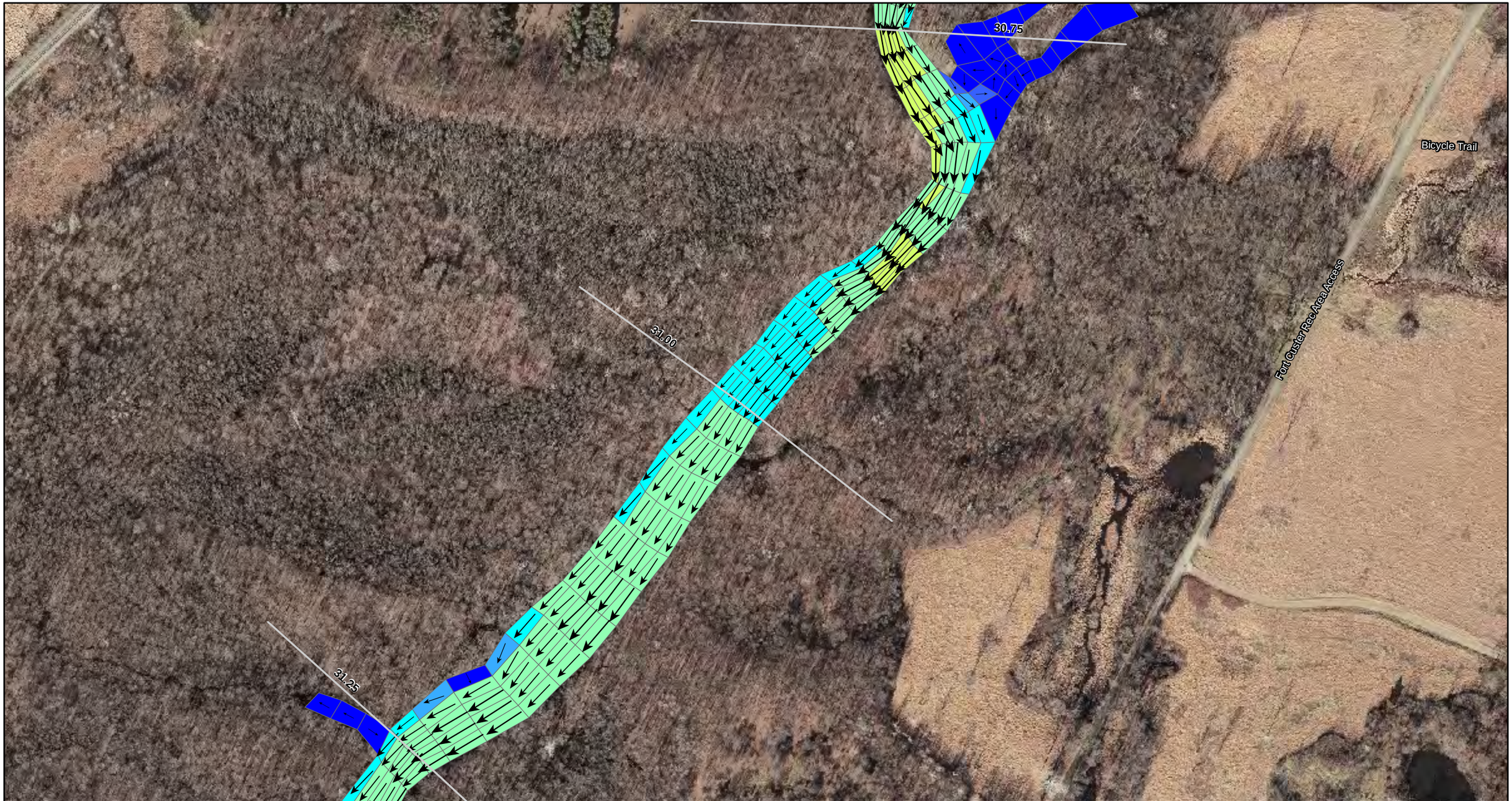
MP 29.95 - MP 30.80

SHEET 39 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

MP 30.75 - MP 31.25

SHEET 40 OF 56

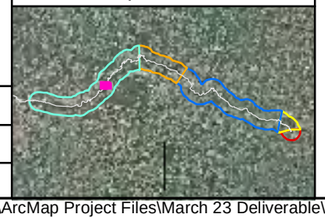
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

MP 31.25 - MP 31.70

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ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

31.75

32.00

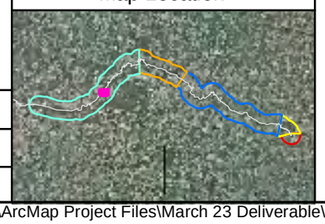
32.25

Bicycle Trail

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

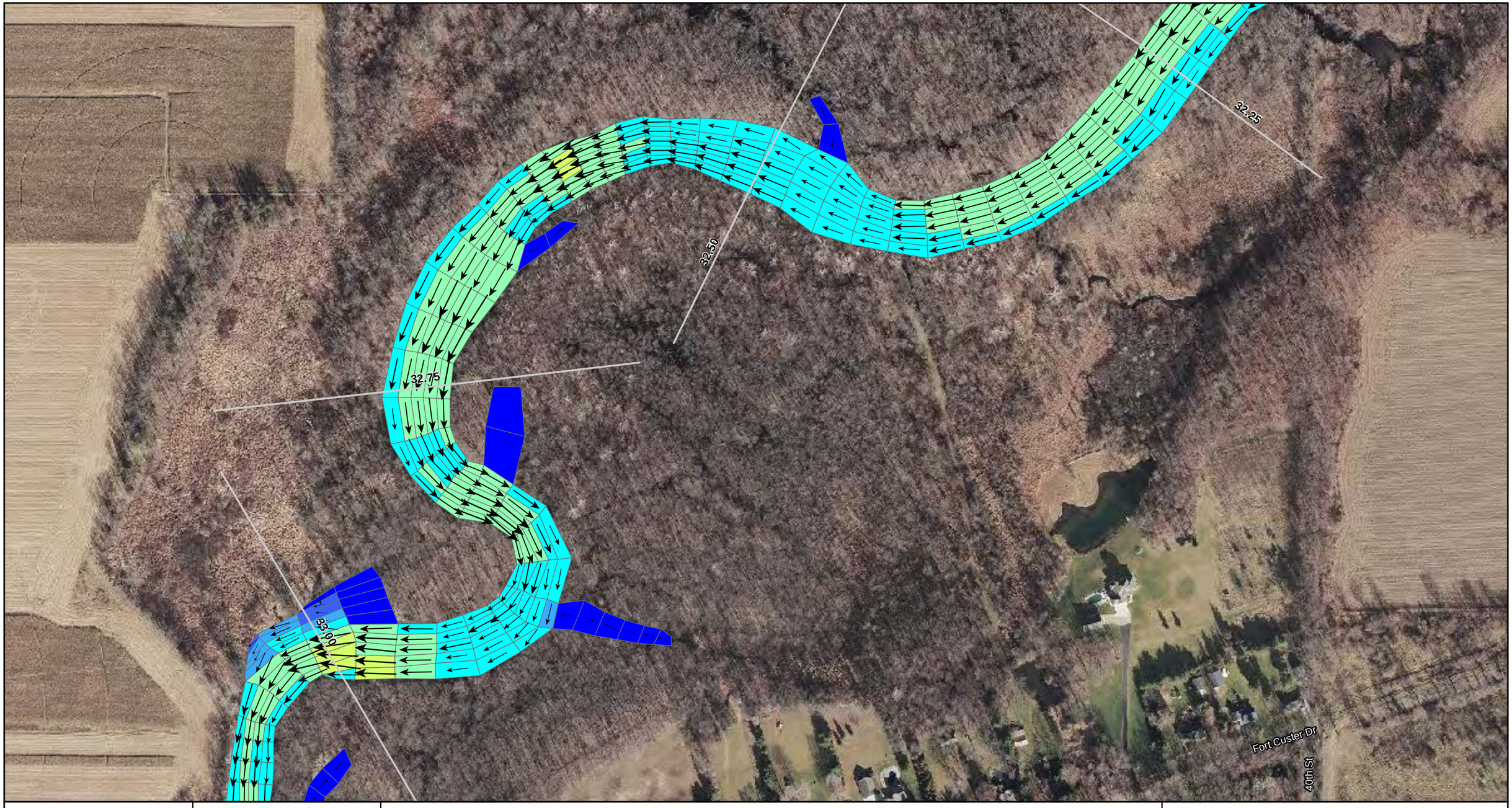
MP 31.65 - MP 32.25

SHEET 42 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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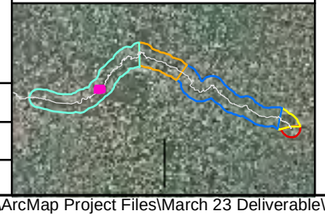
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

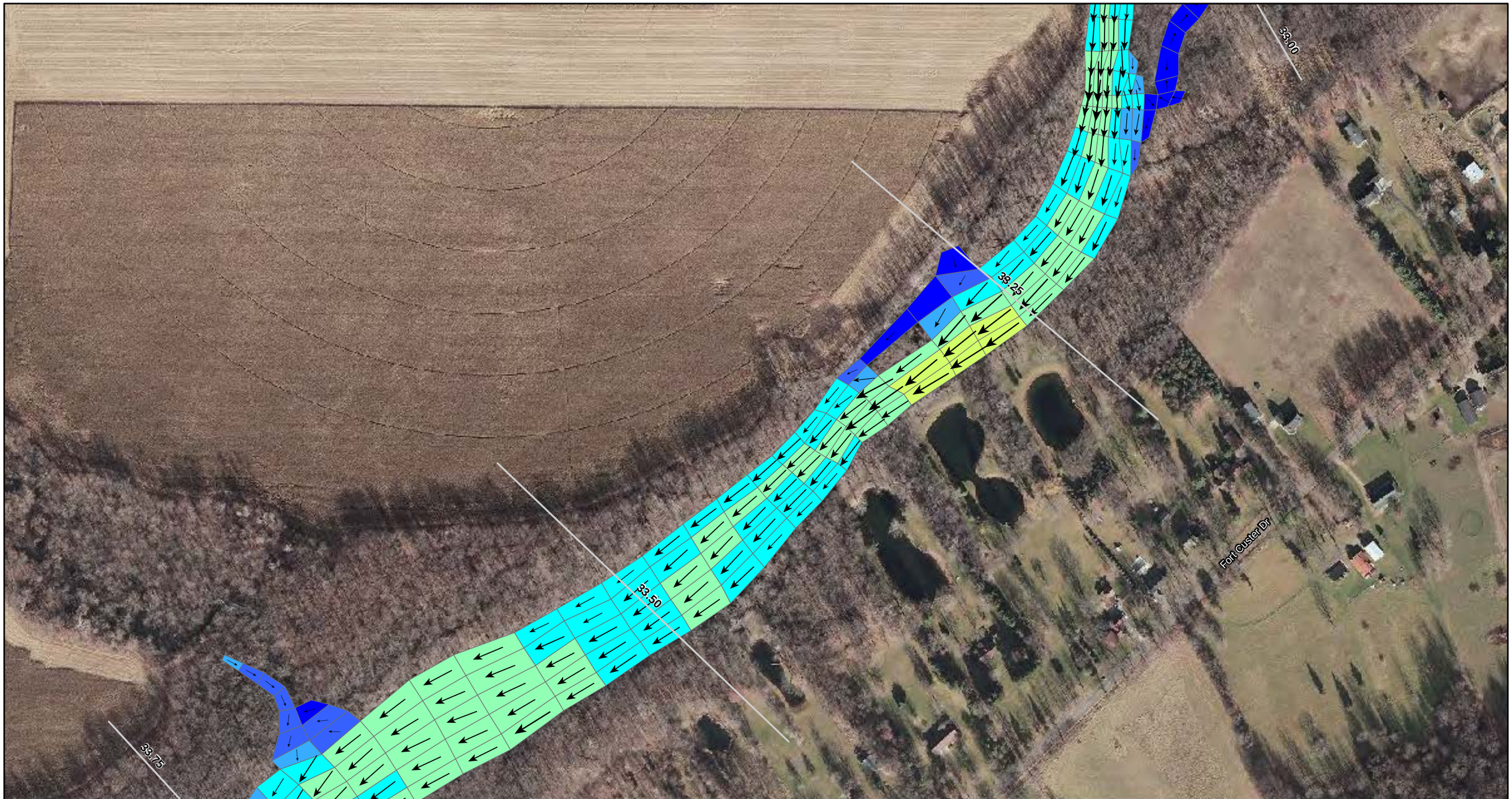
MP 32.25 - MP 33.10

SHEET 43 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

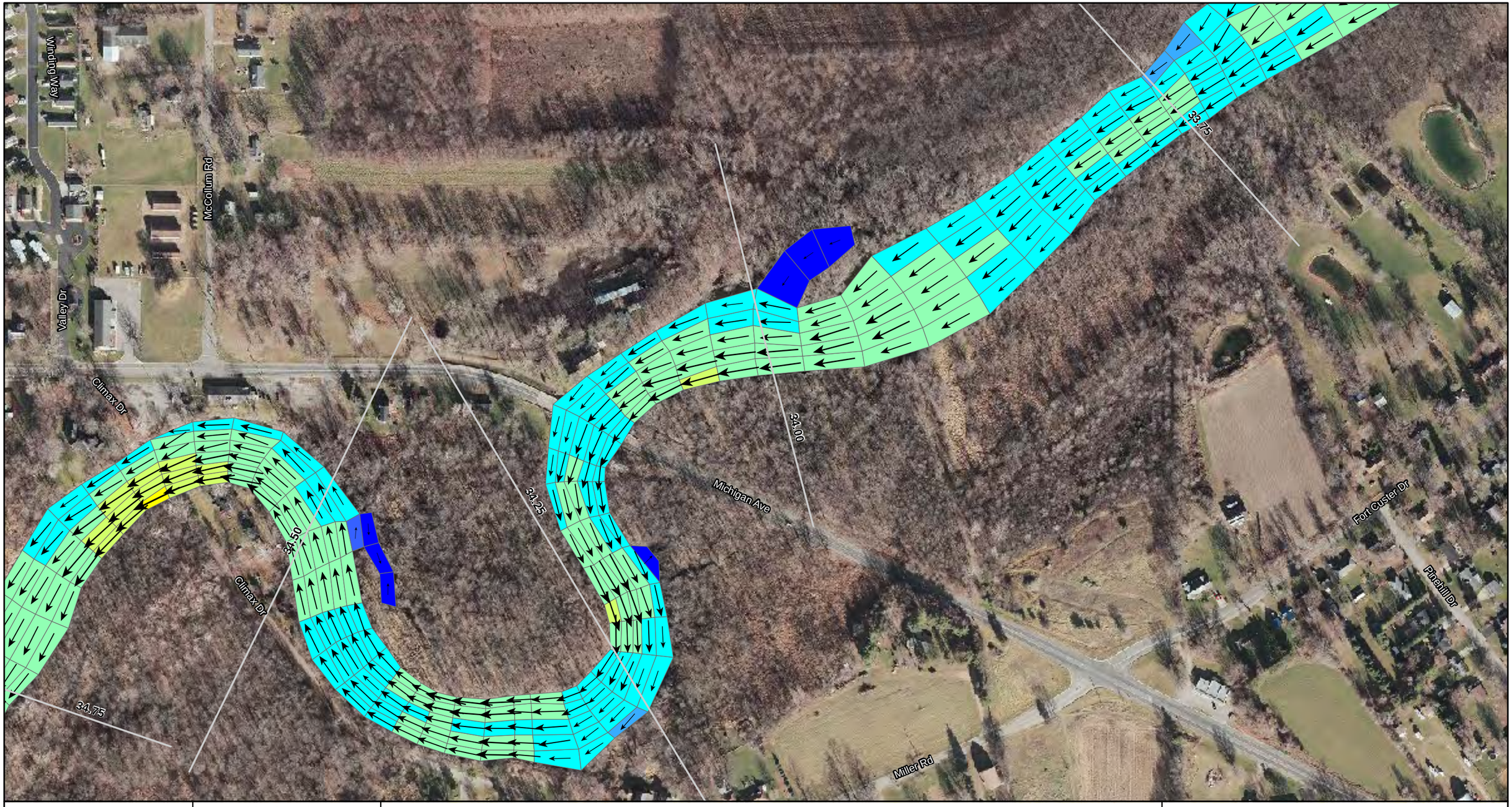
MP 33.10 - MP 33.70

SHEET 44 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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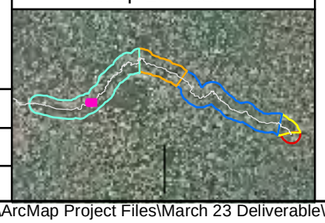
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

MP 33.70 - MP 34.70

SHEET 45 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

Aerial Photography Date: November 2011



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

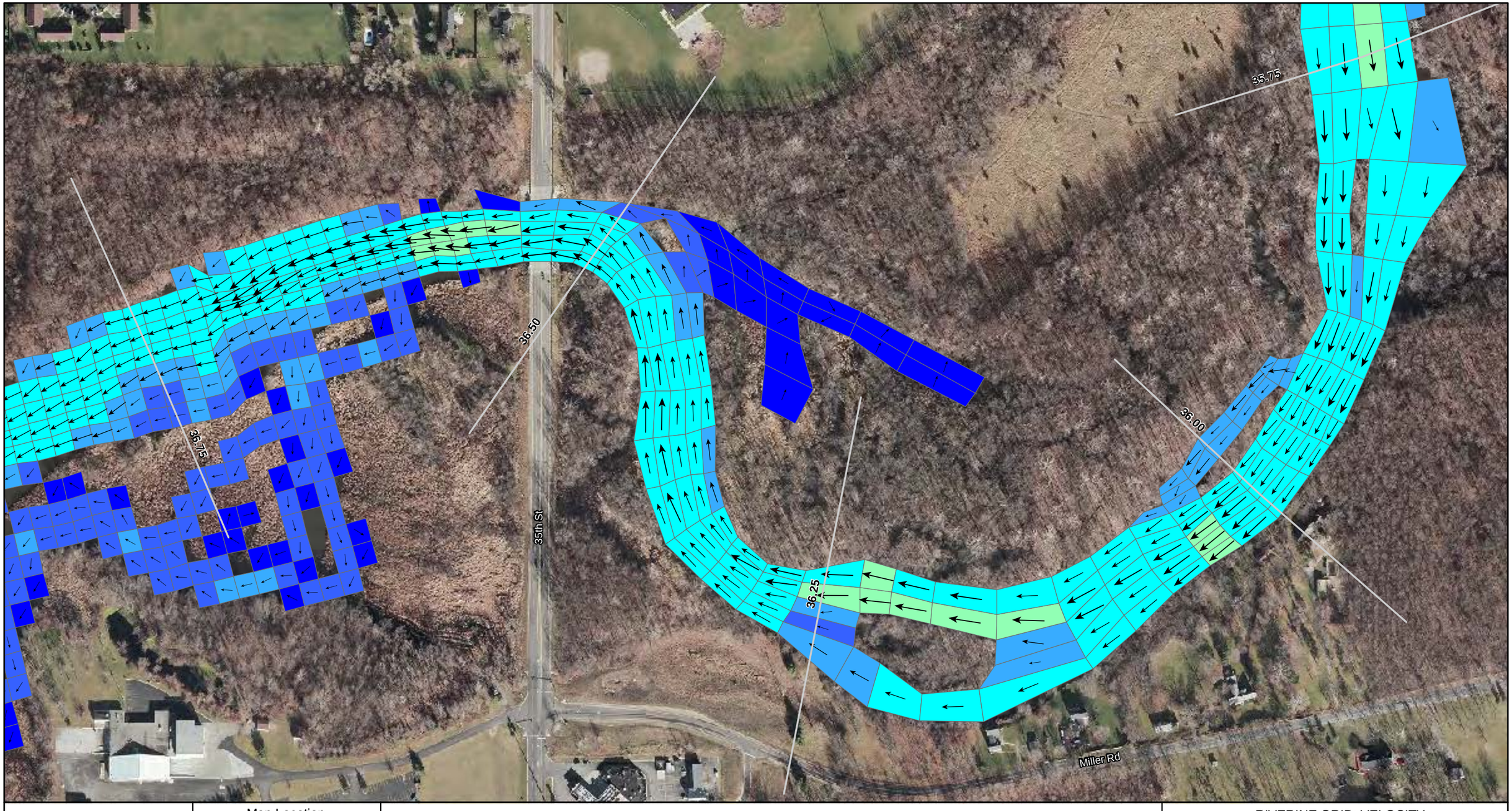
MP 34.70 - MP 35.75

SHEET 46 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

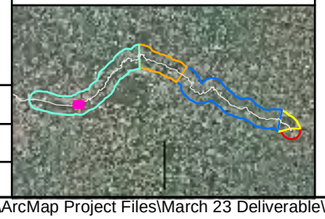
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

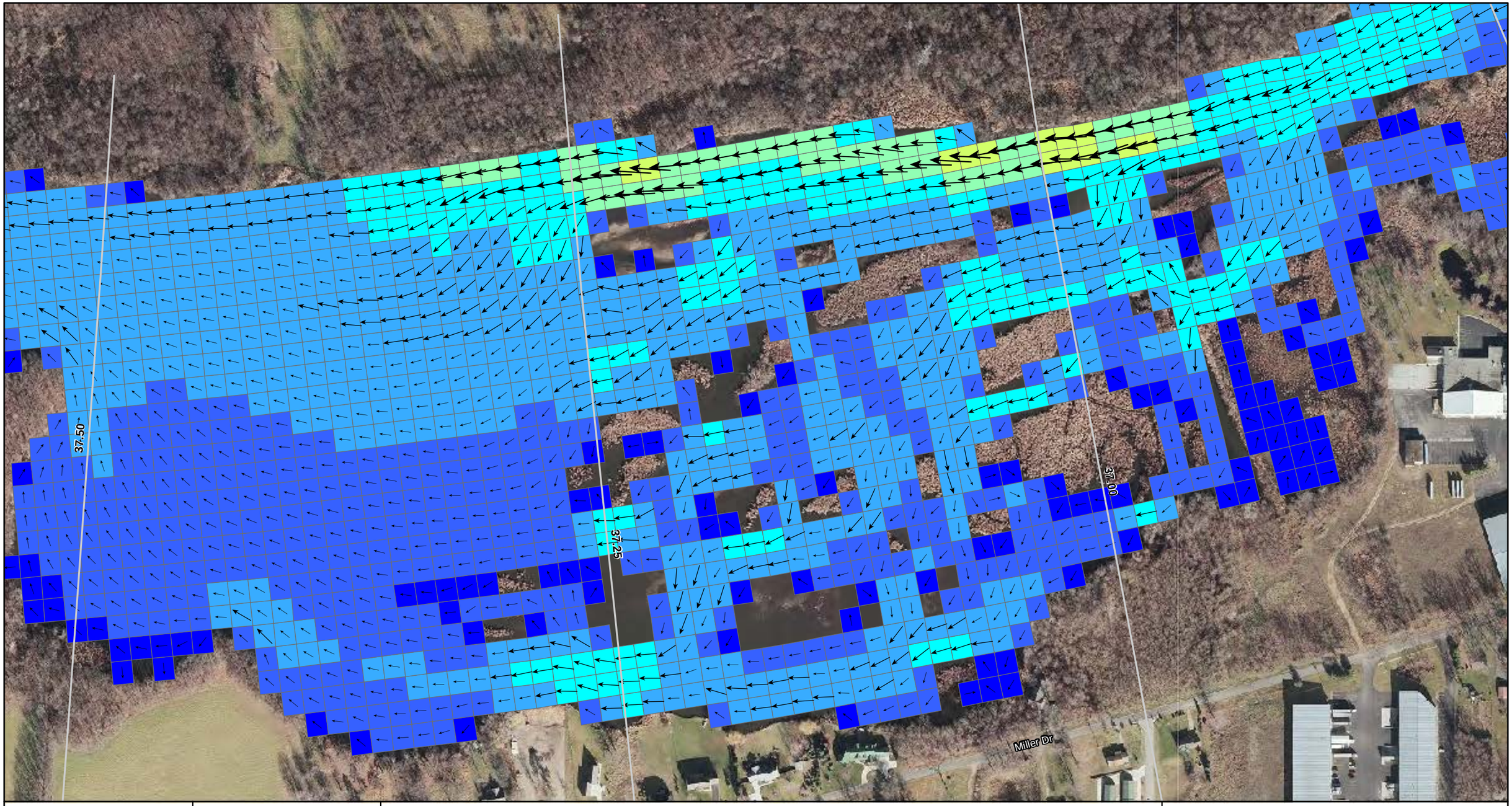
MP 35.75 - MP 36.80

SHEET 47 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

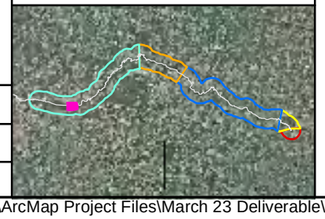
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

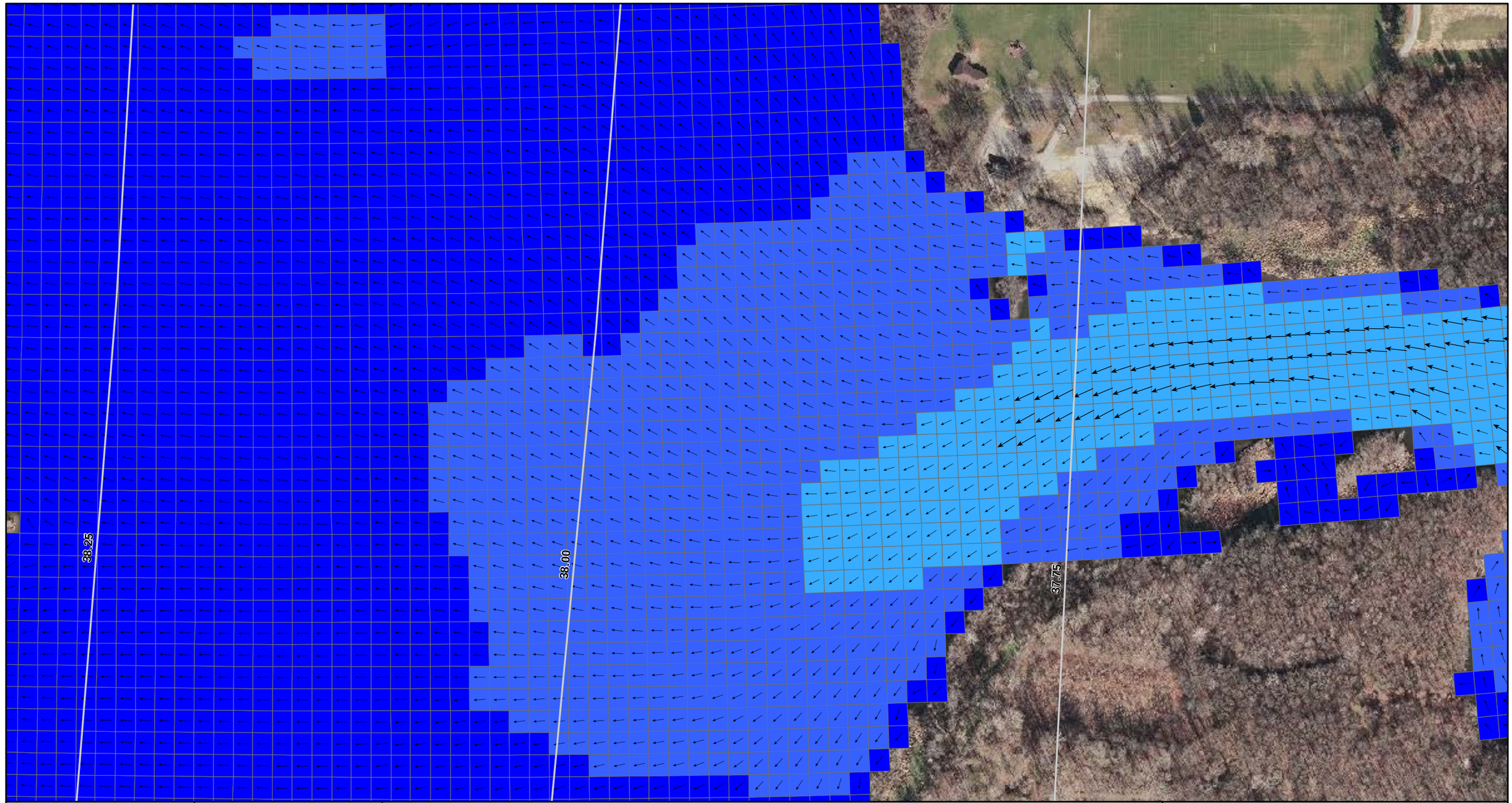
MP 36.80 - MP 37.55

SHEET 48 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

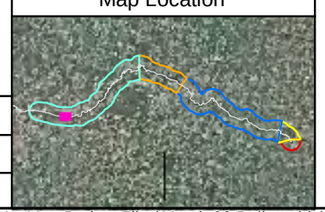
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

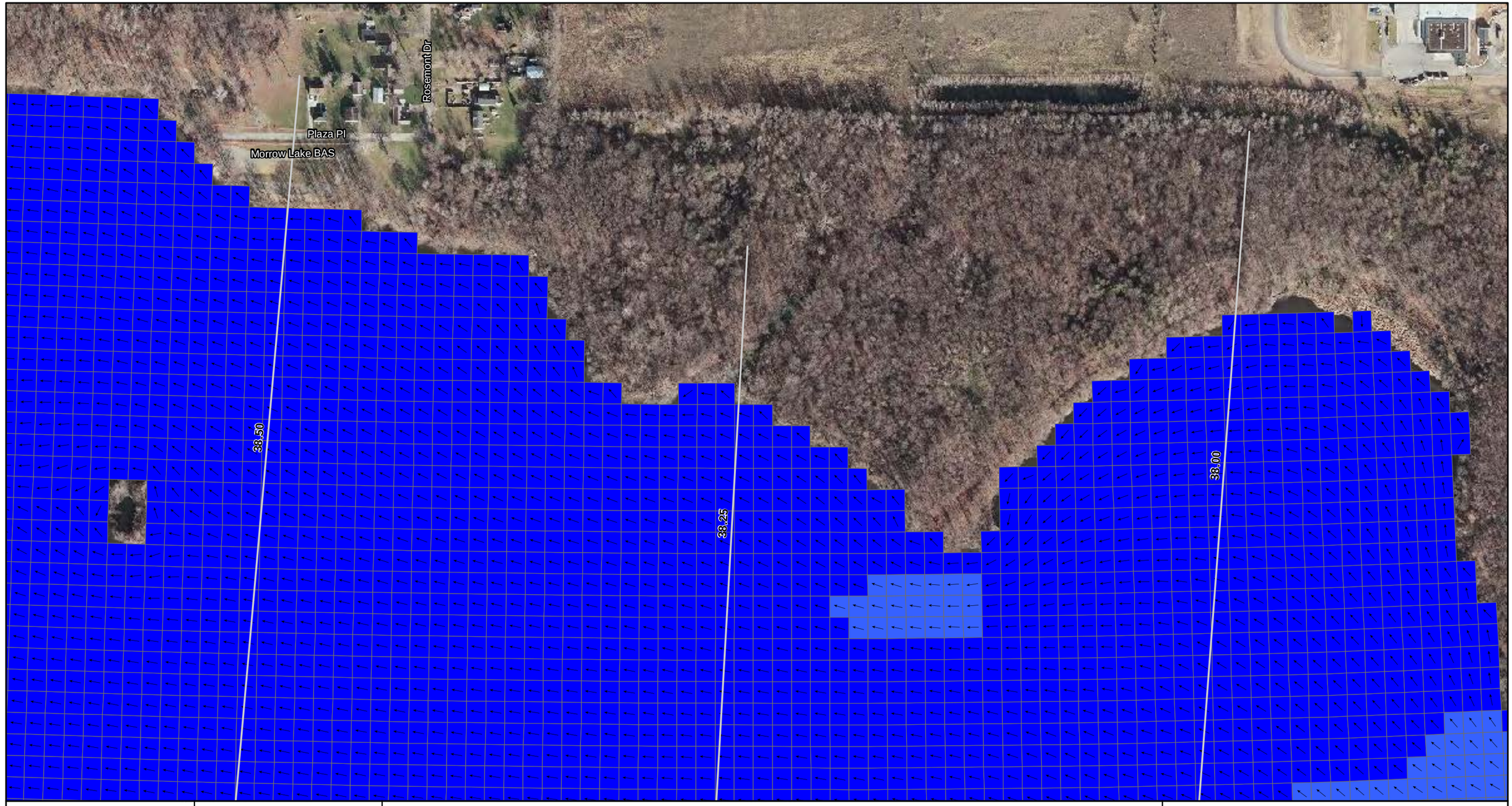
MP 37.55 - MP 38.30

SHEET 49 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

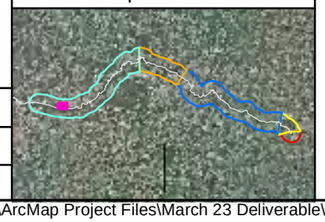
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

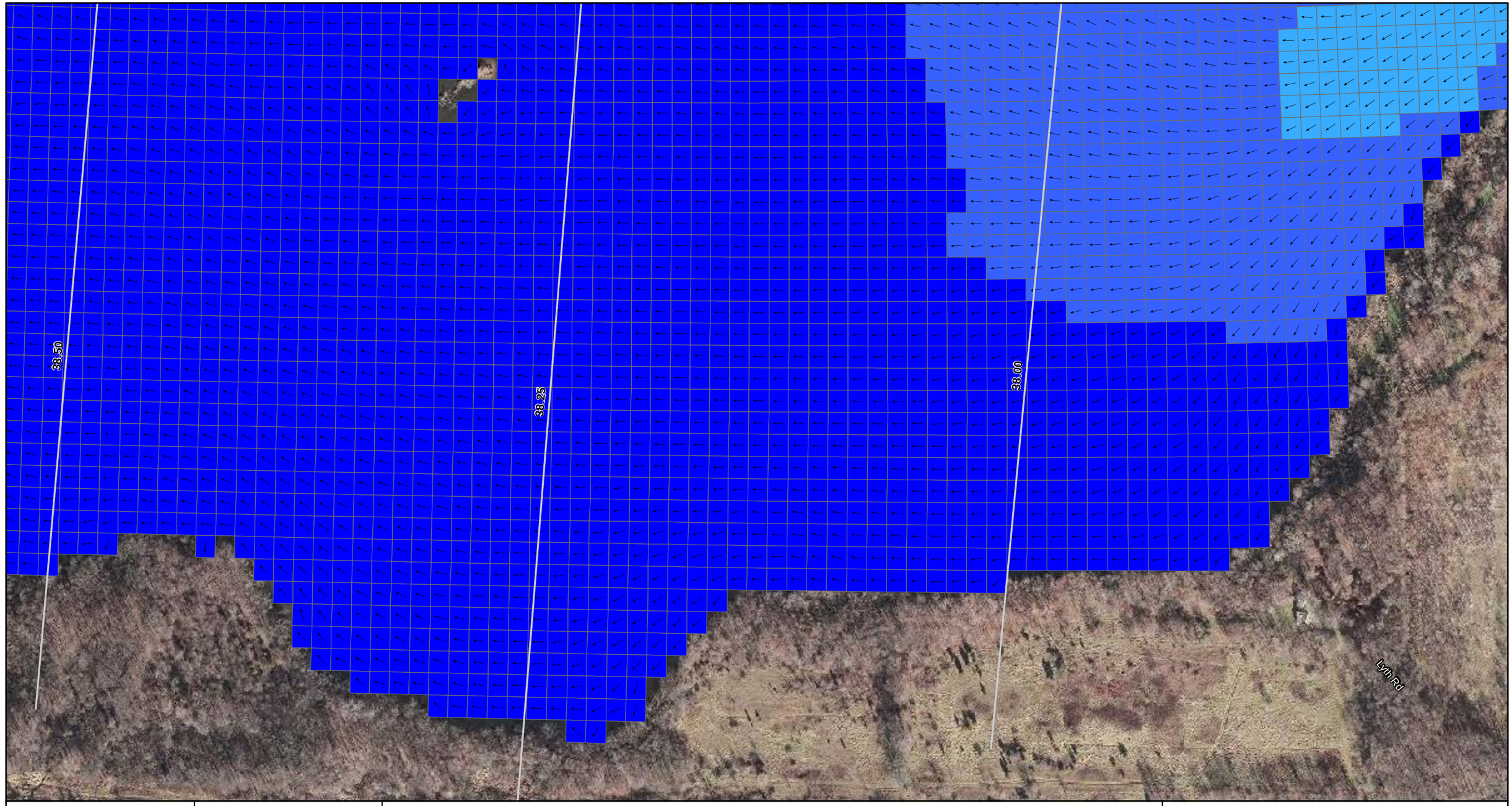
MP 37.80 - MP 38.60N

SHEET 50 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

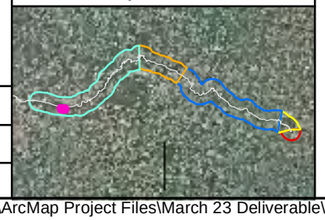
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

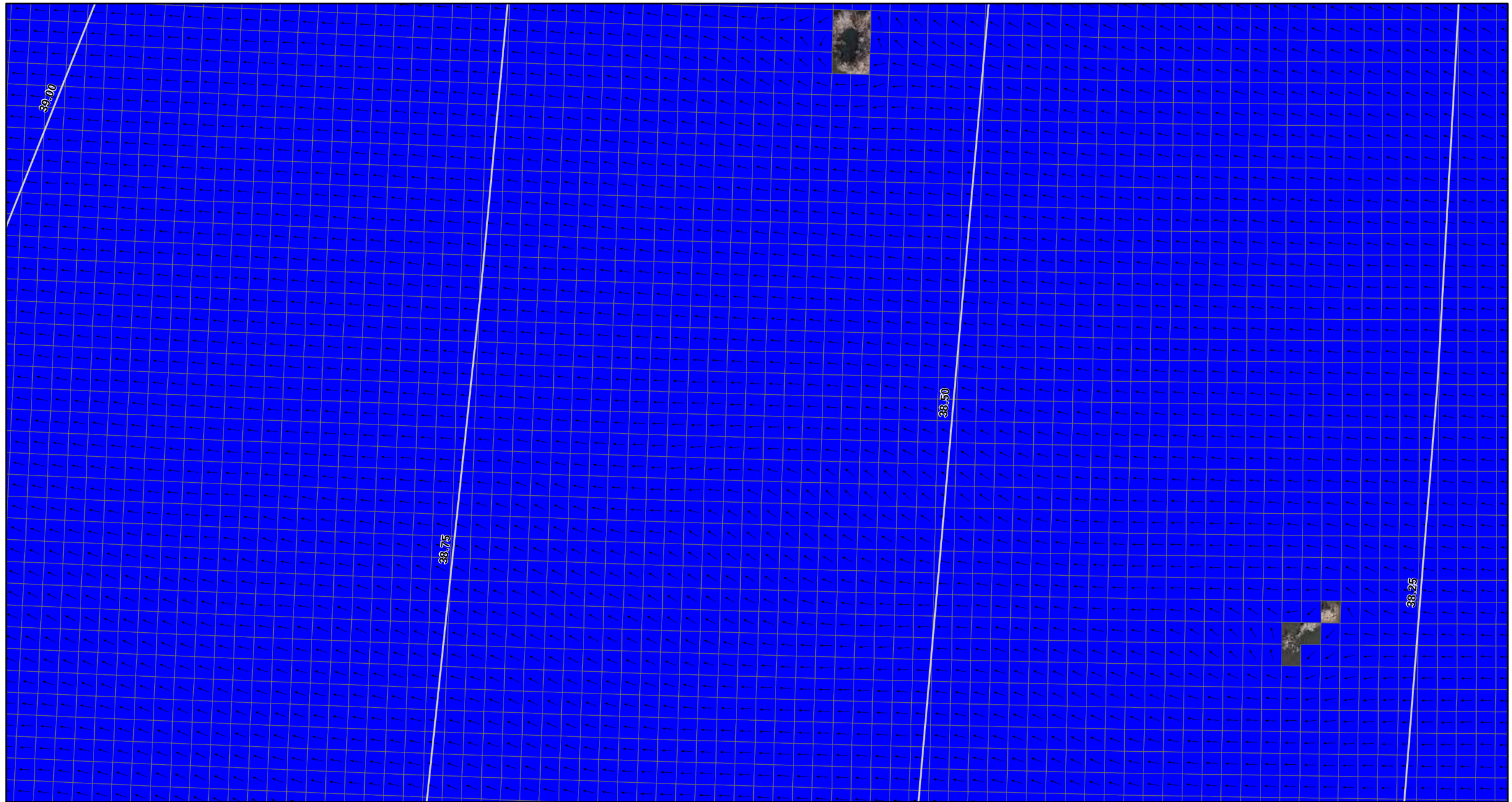
MP 37.80 - MP 38.60S

SHEET 51 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

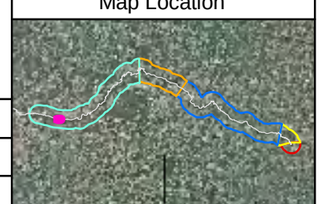
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

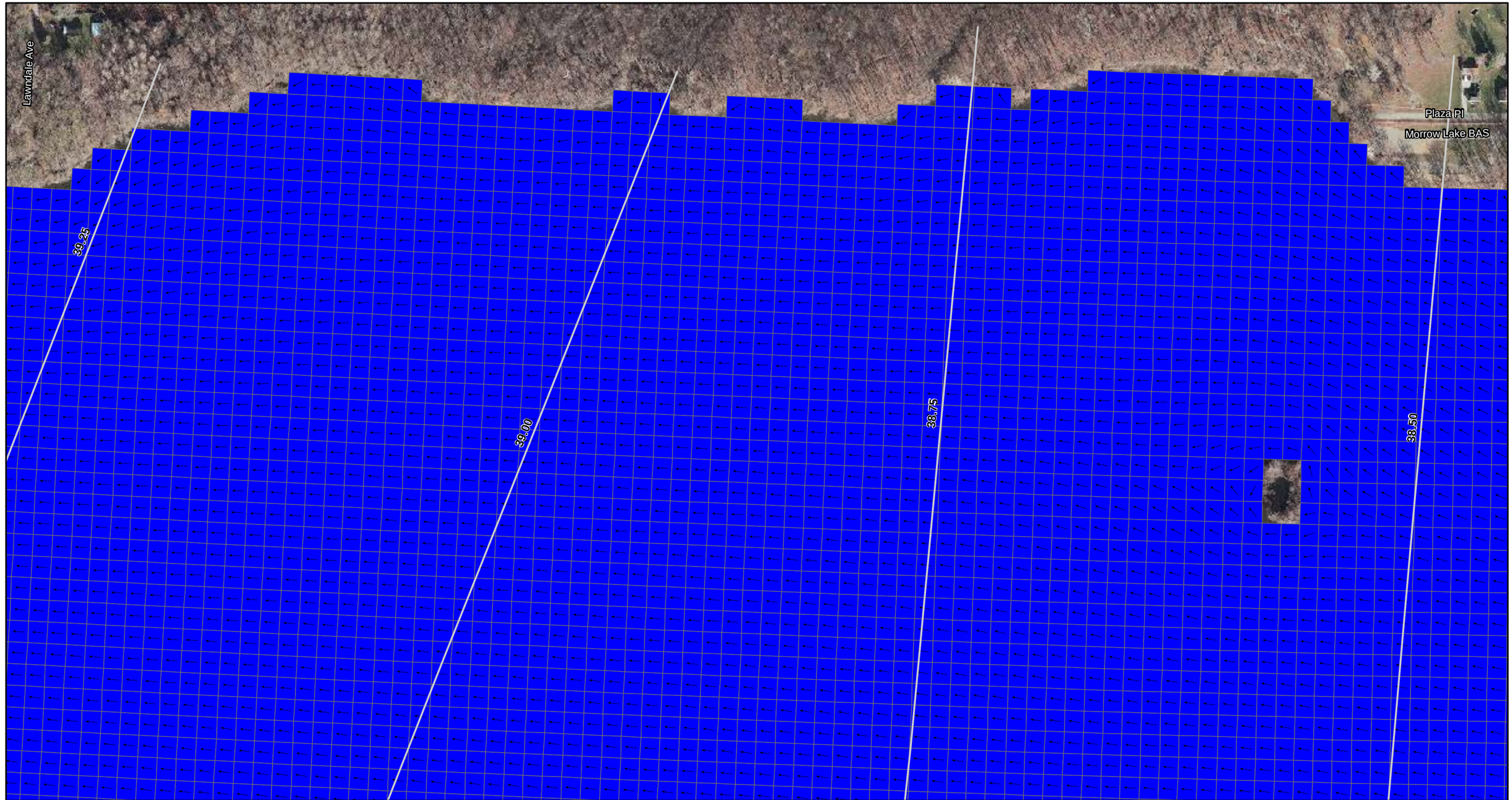
MP 38.25 - MP 39.00C

SHEET 52 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

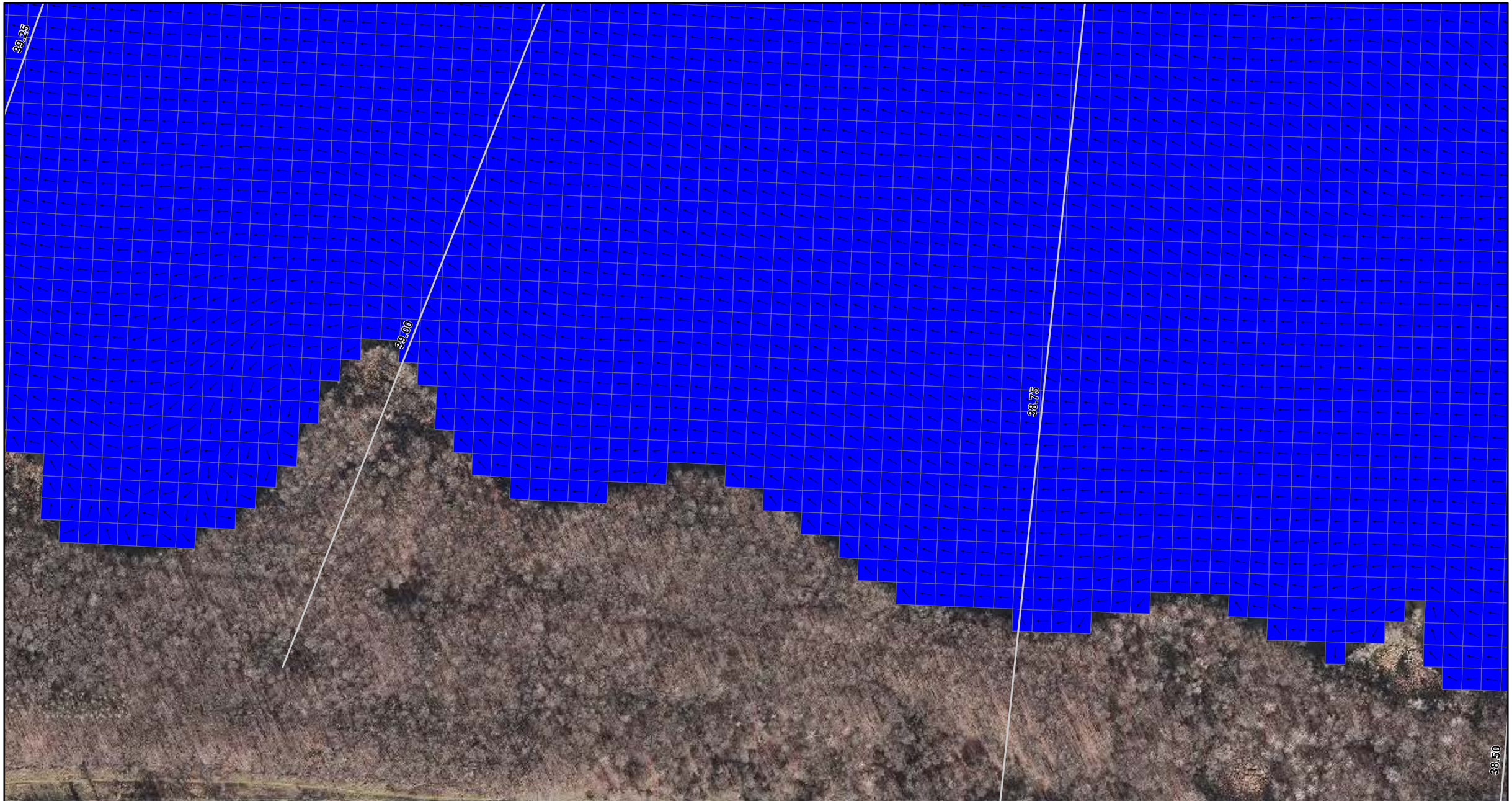
MP 38.50 - MP 39.25N

SHEET 53 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

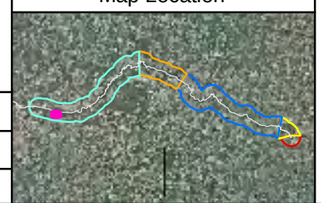
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

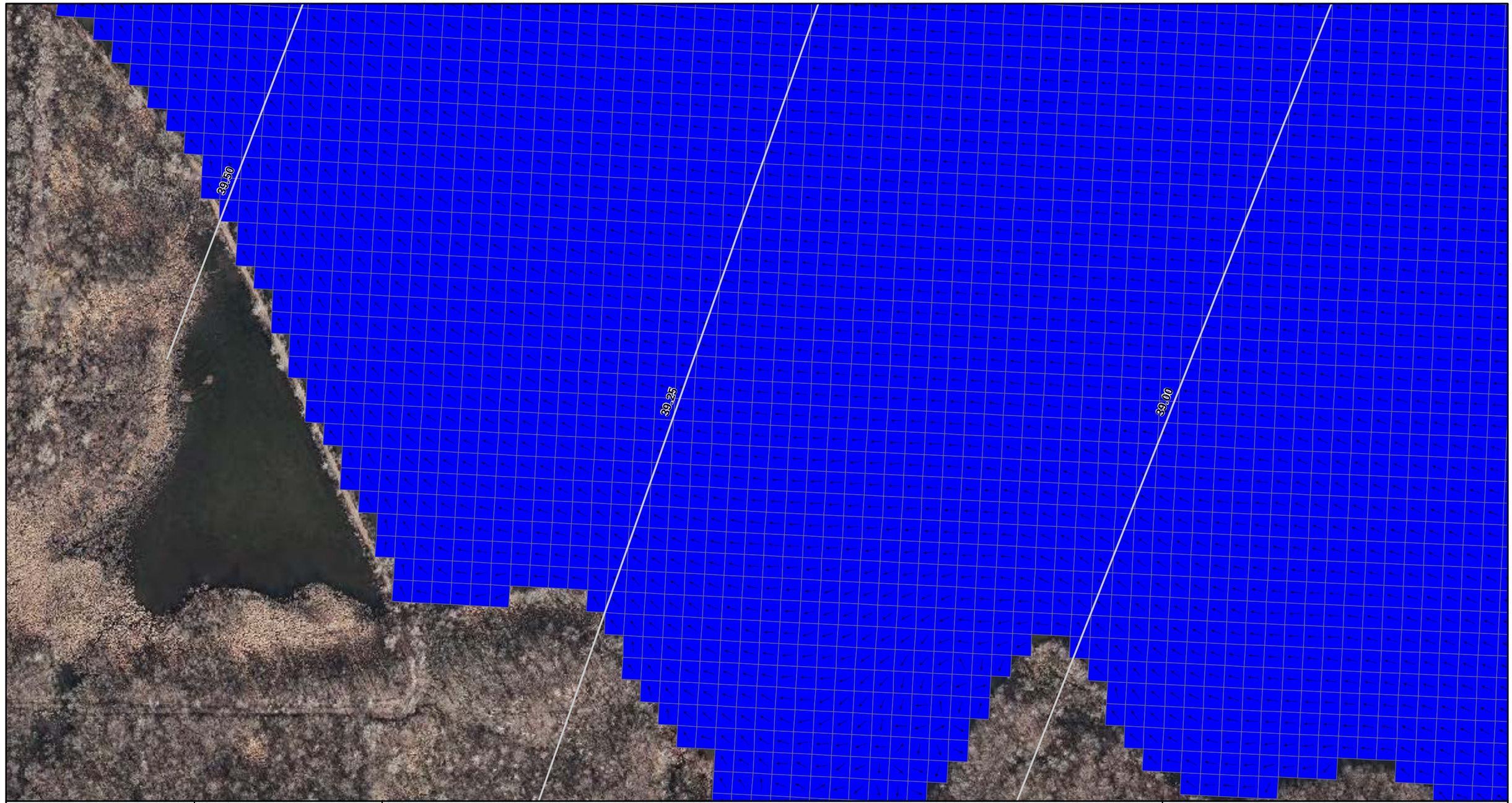
MP 38.50 - MP 39.25S

SHEET 54 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

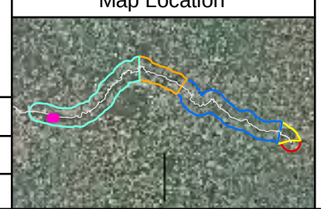
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

← Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

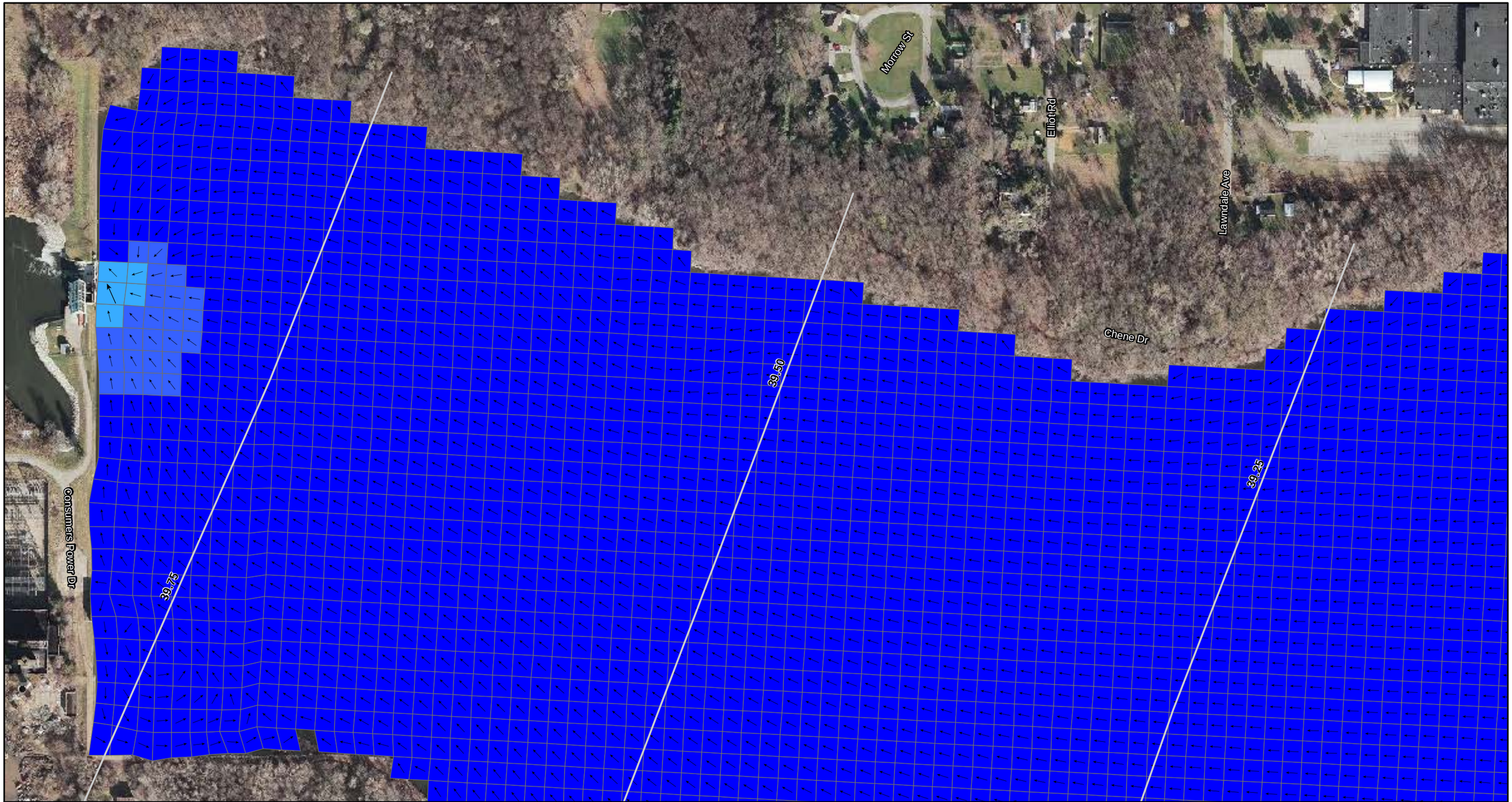
MP 38.90 - MP 39.60S

SHEET 55 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

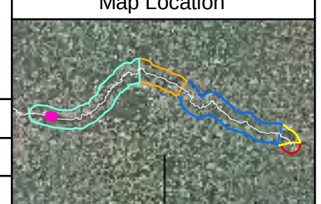
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec) - September 10, 2010

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude

Quarter Mile Grid Segment

ft/sec = Feet Per Second
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: VELOCITY
SEPTEMBER 10, 2010

MP 39.15 - MP 39.85

SHEET 56 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Velocity_Sep10_2010.mxd

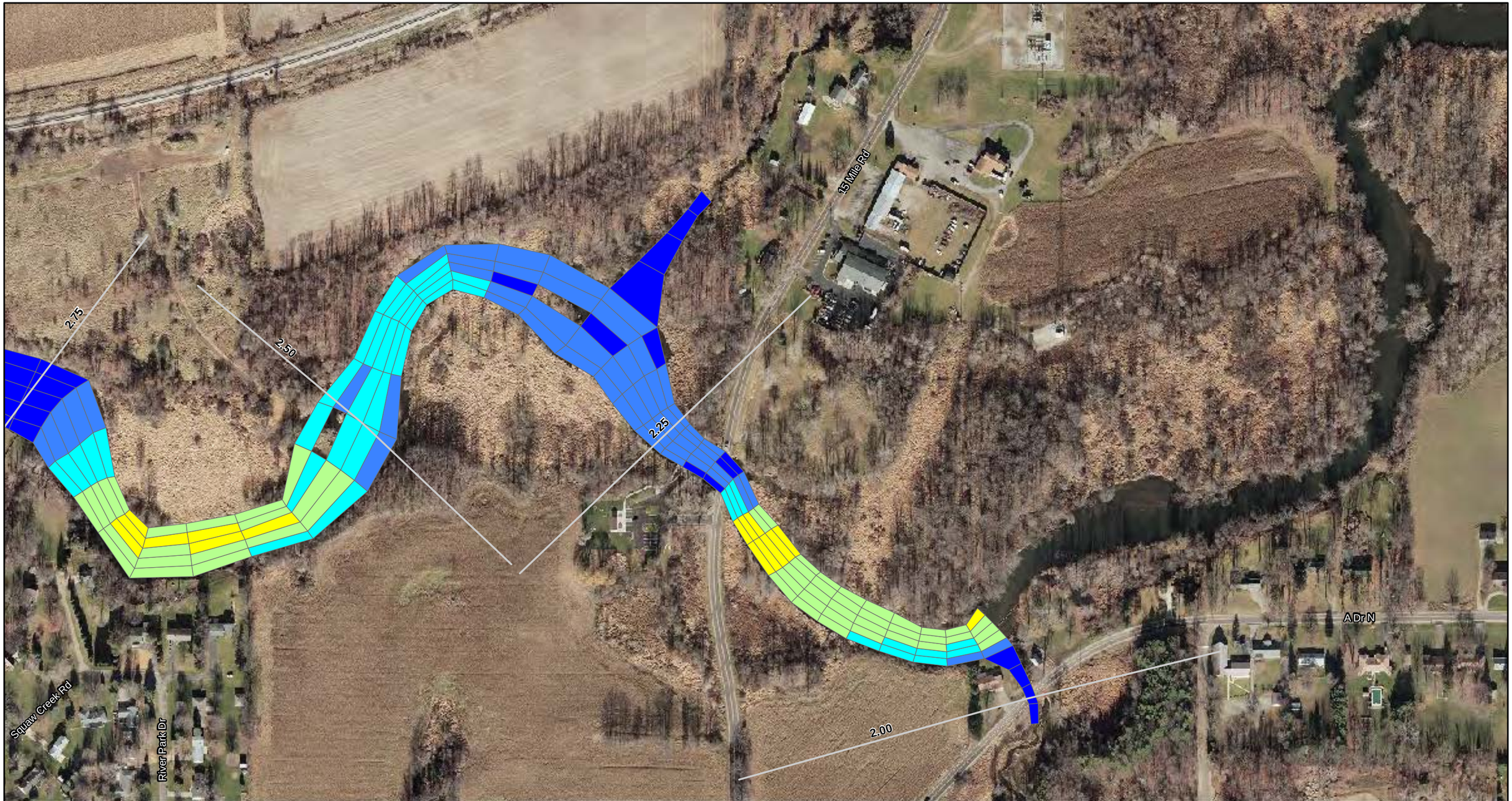
Aerial Photography Date: November 2011

Figure 6-6

Riverine Grid: Bed Shear Stress

September 8, 2010

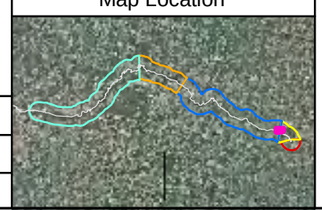
Sheets 1 through 56



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

MP 01.95 - MP 02.75

SHEET 1 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep8_2010.mxd

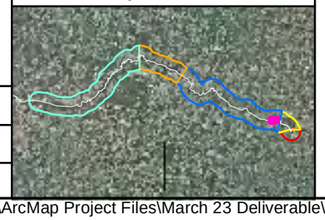
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

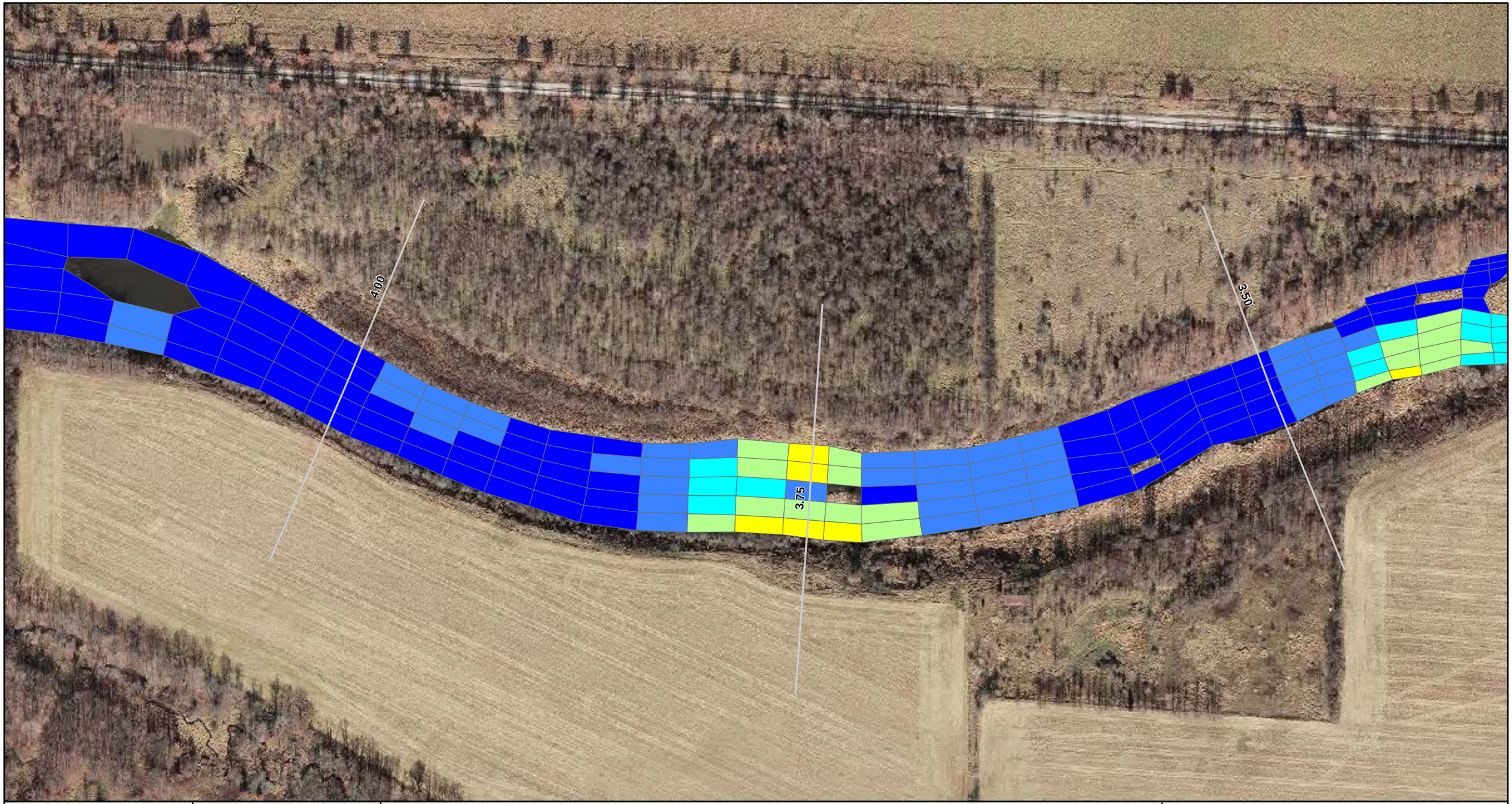
MP 02.60 - MP 03.40

SHEET 2 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep8_2010.mxd

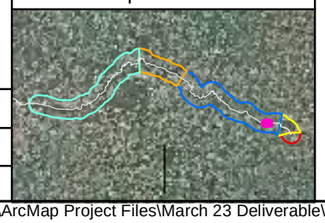
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

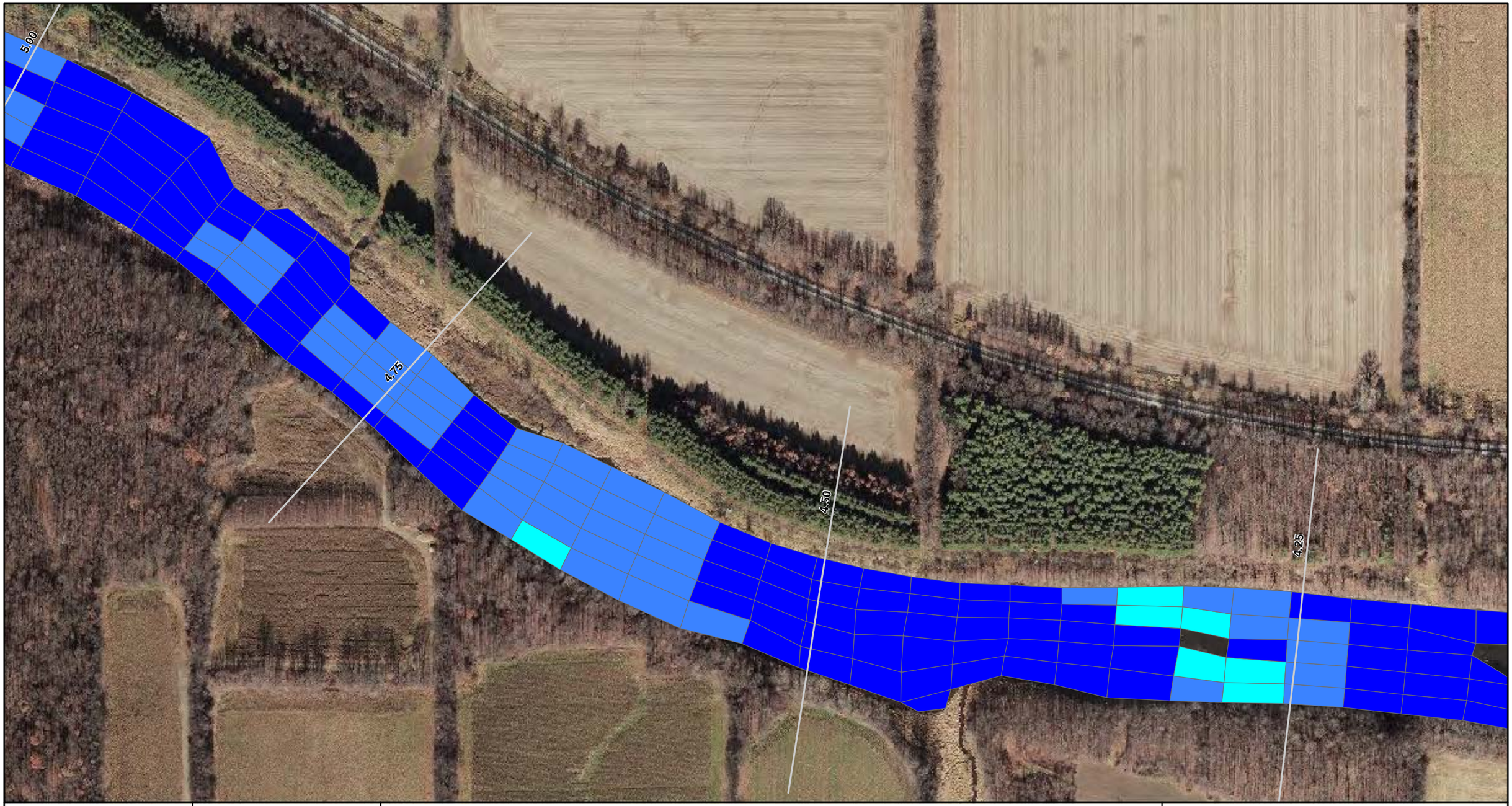
MP 03.40 - MP 04.20

SHEET 3 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

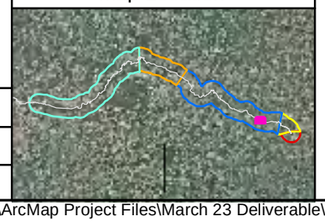
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep8_2010.mxd

Aerial Photography Date: November 2011



Drawn:	BRS 3/22/2012
Approved:	DBR 3/22/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

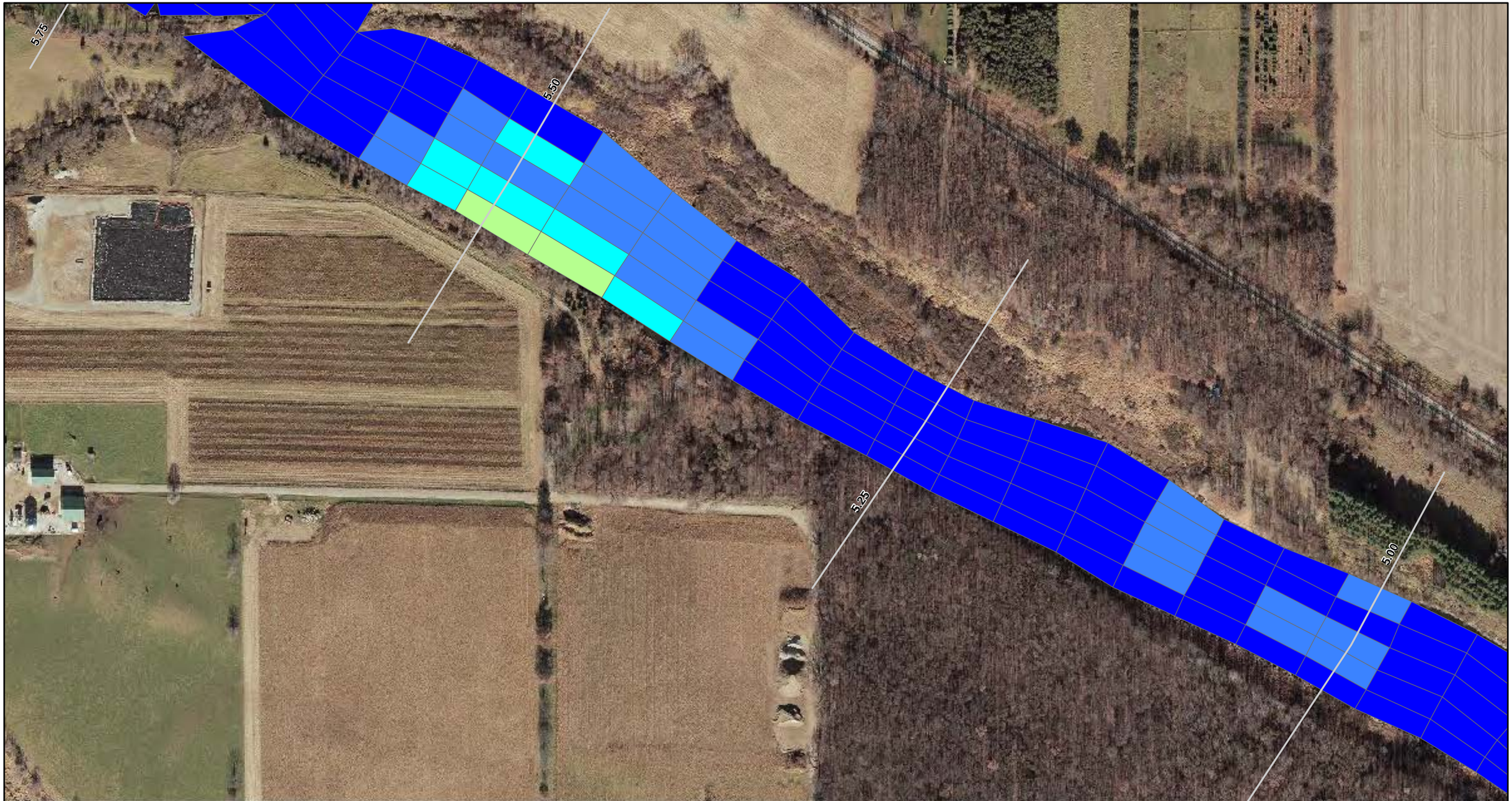
MP 04.15 - MP 05.00

SHEET 4 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep8_2010.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

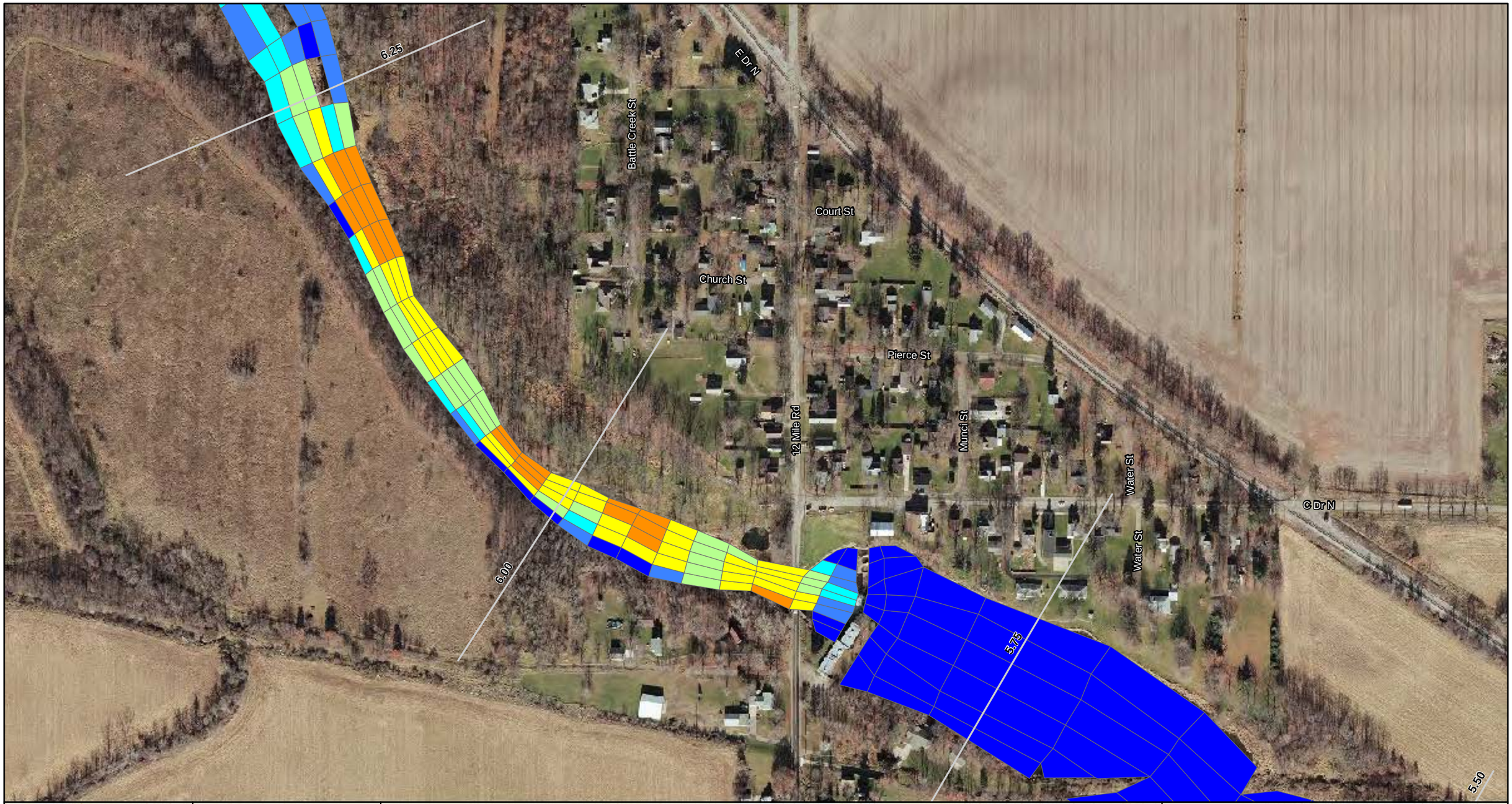
MP 04.90 - MP 05.65

SHEET 5 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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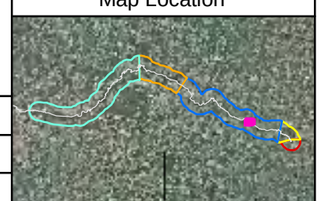
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

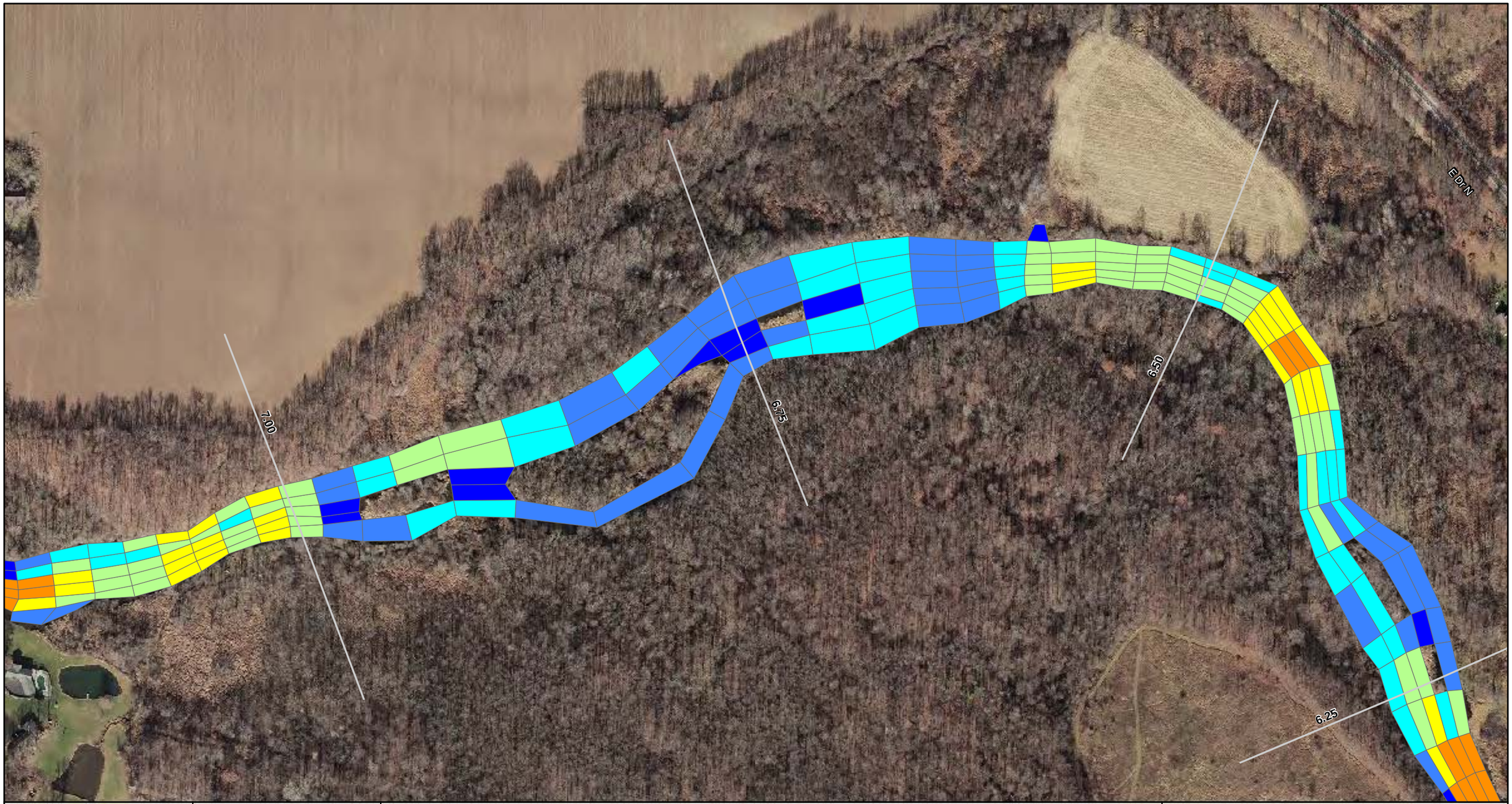
MP 05.65 - MP 06.30

SHEET 6 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

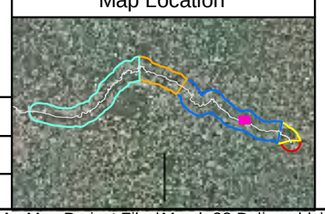
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep8_2010.mxd

Aerial Photography Date: November 2011



Drawn:	BRS 3/22/2012
Approved:	DBR 3/22/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

MP 06.20 - MP 07.15

SHEET 7 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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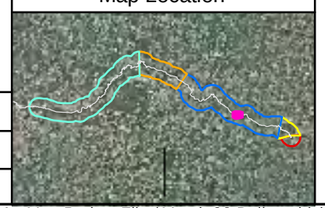
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

MP 07.15 - MP 07.95

SHEET 8 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

8.75

8.50

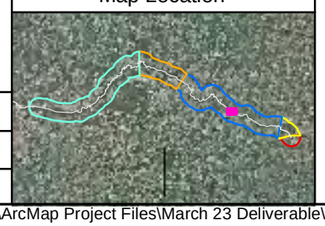
8.25

8.00

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

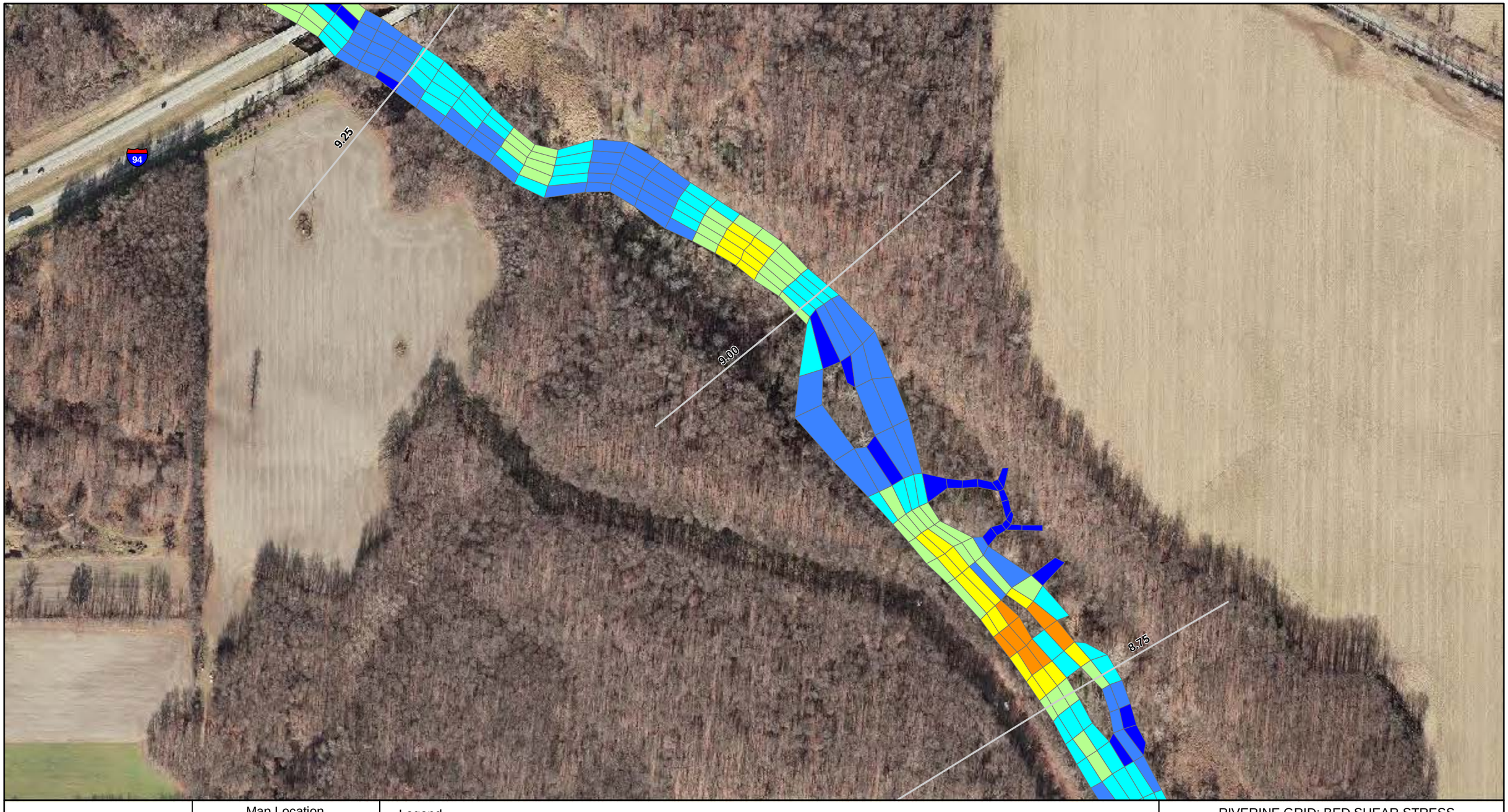
MP 07.90 - MP 08.75

SHEET 9 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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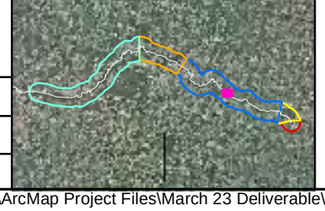
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

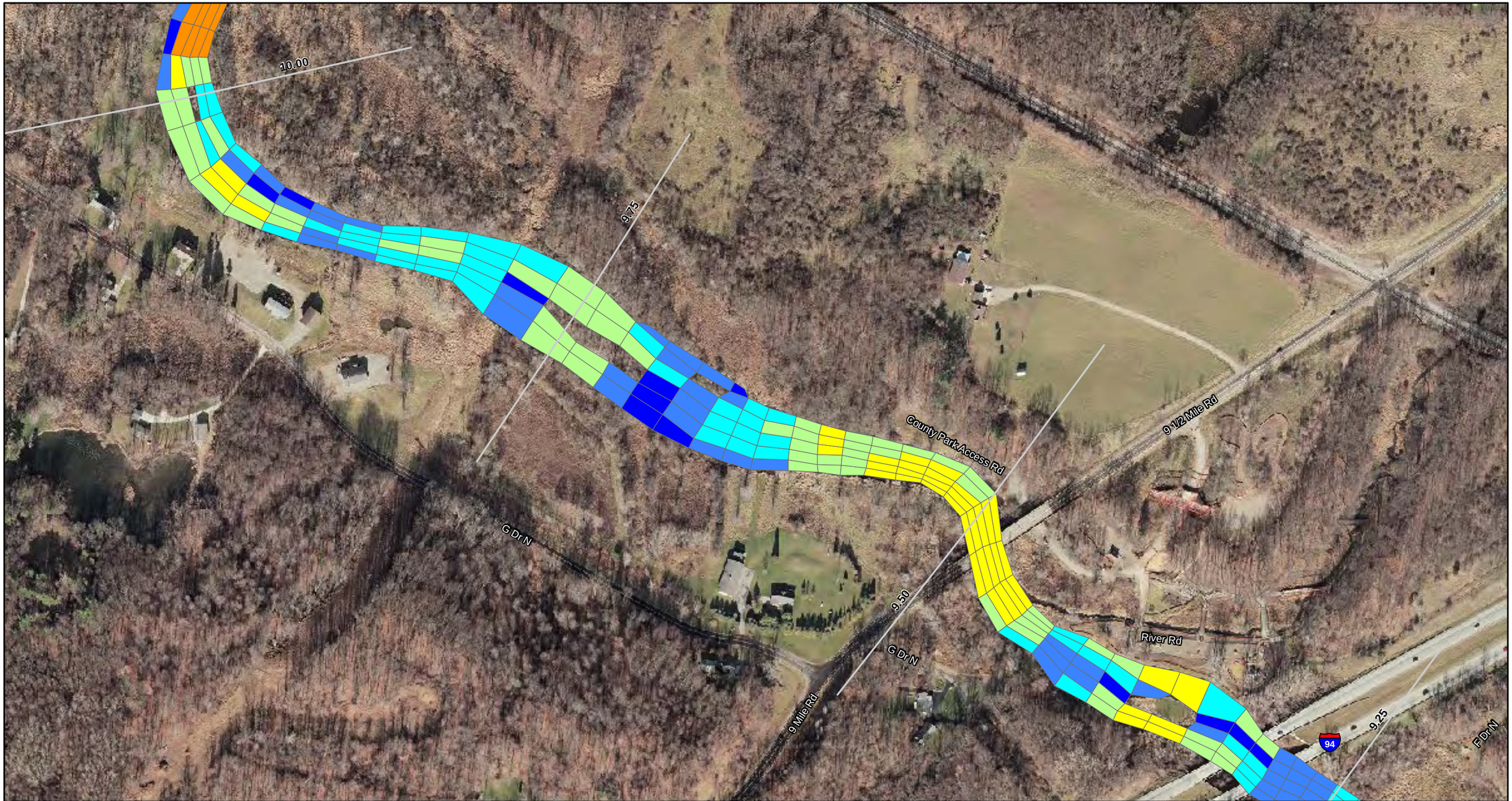
MP 08.70 - MP 09.30

SHEET 10 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

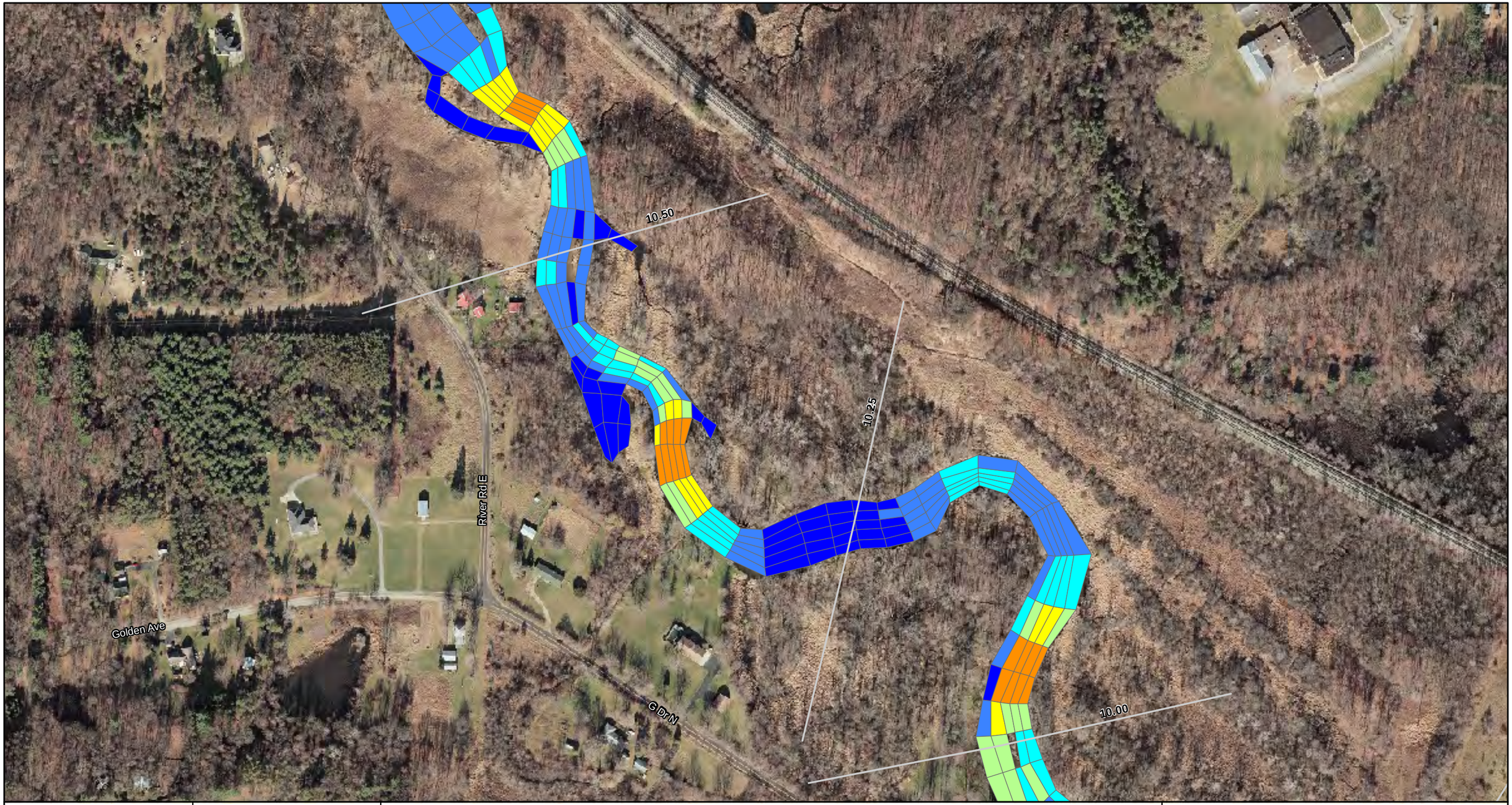
MP 09.25 - MP 10.05

SHEET 11 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

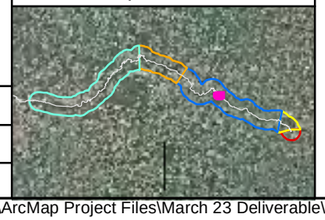
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep8_2010.mxd

Aerial Photography Date: November 2011



Drawn:	BRS 3/22/2012
Approved:	DBR 3/22/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010
- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

MP 10.00 - MP 10.65

SHEET 12 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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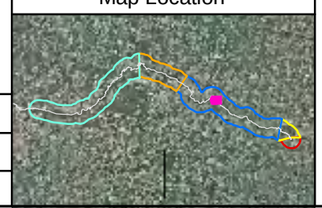
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

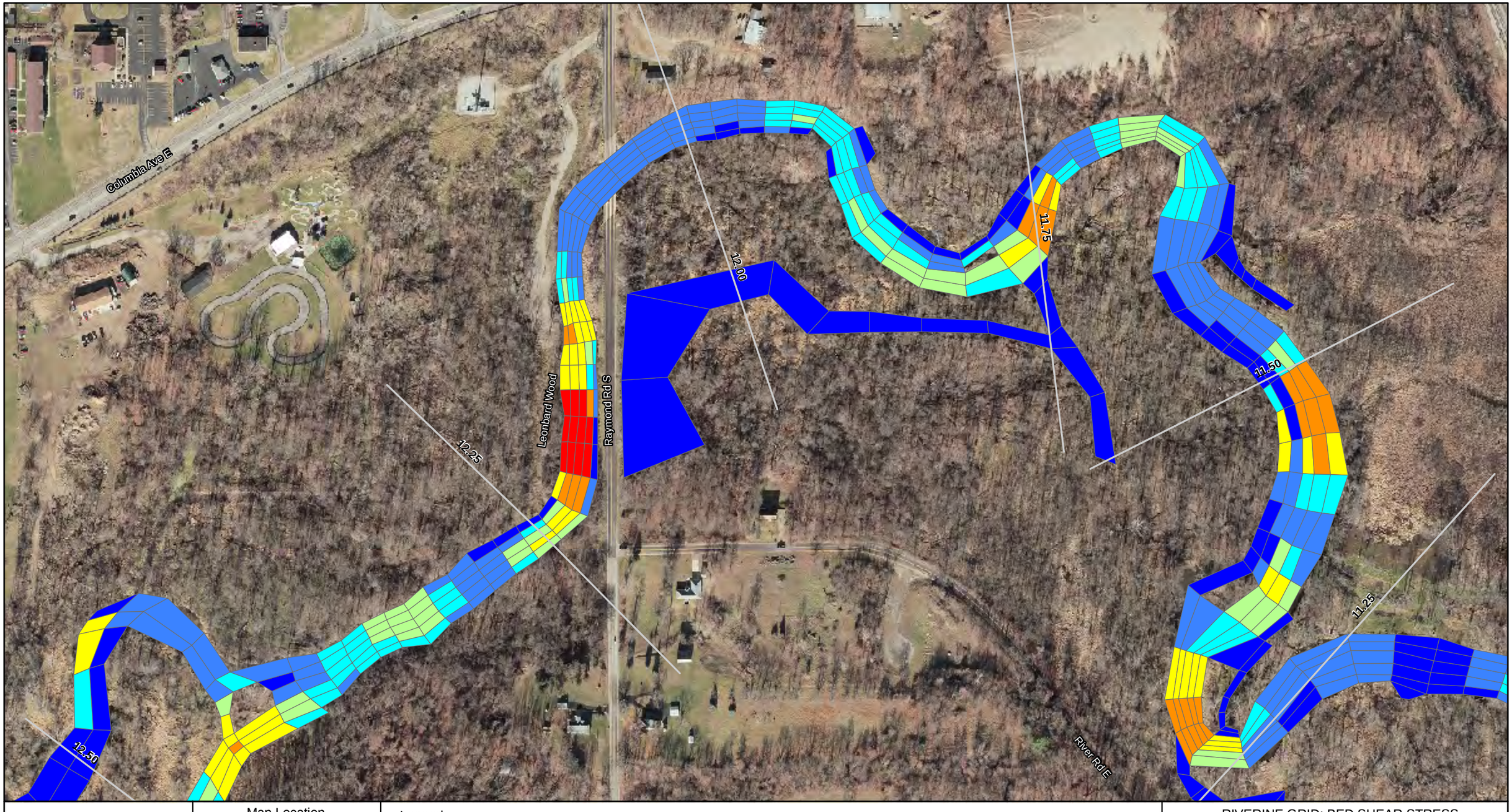
MP 10.60 - MP 11.40

SHEET 13 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

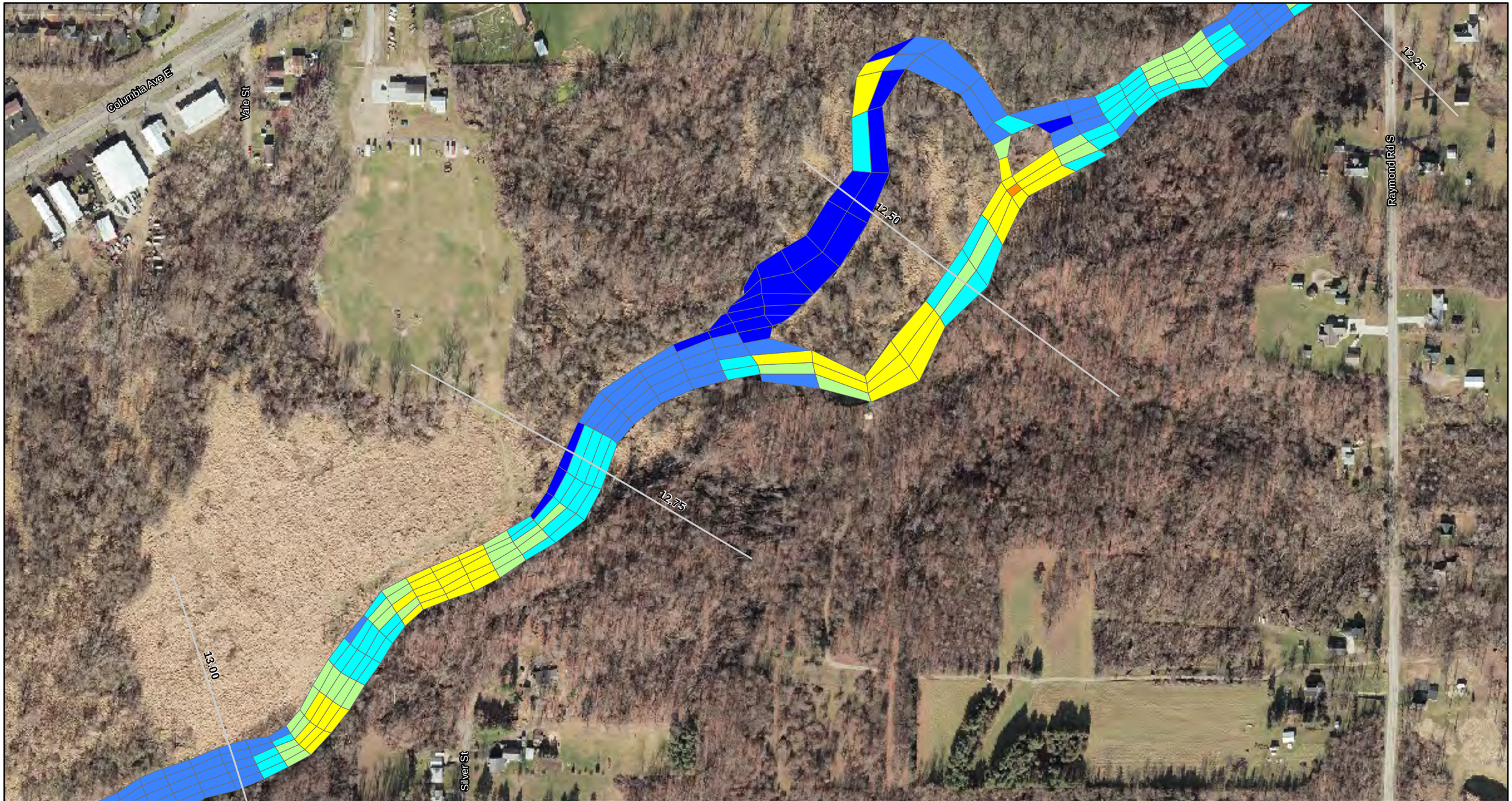
MP 11.10 - MP 12.45

SHEET 14 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

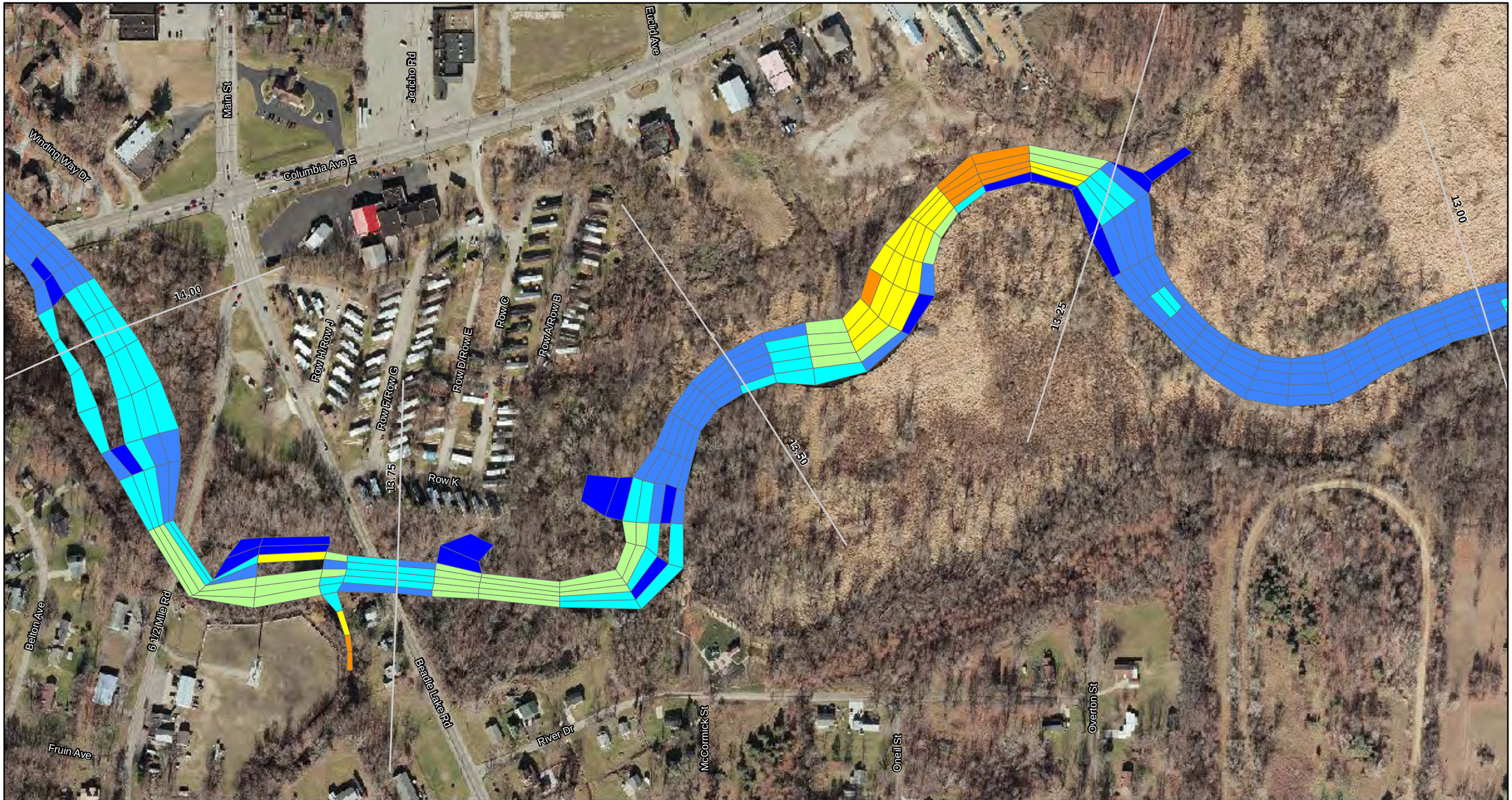
MP 12.30 - MP 13.05

SHEET 15 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

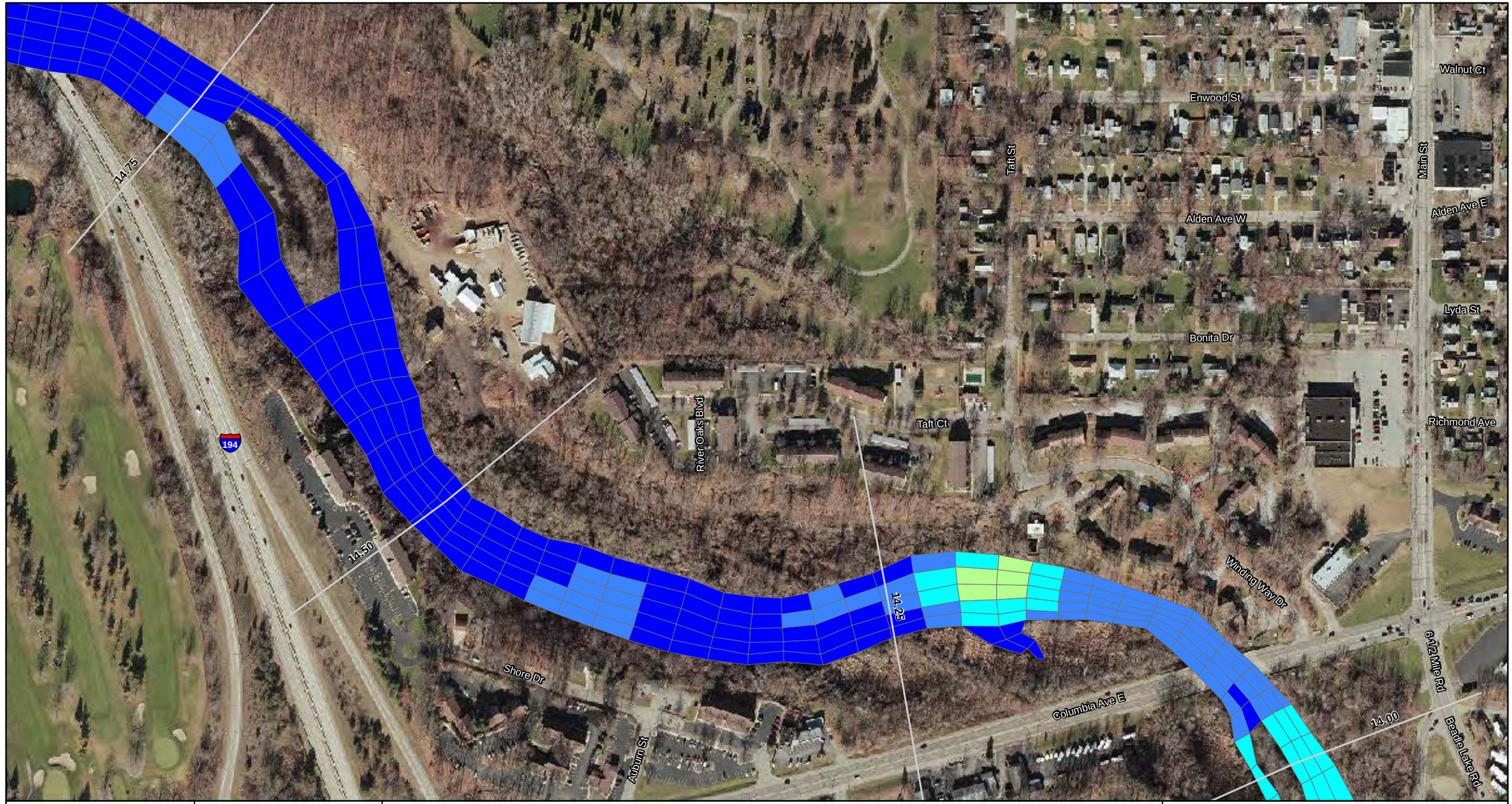
MP 13.00 - MP 14.10

SHEET 16 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep8_2010.mxd

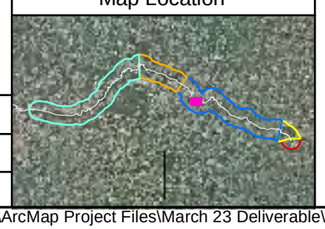
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

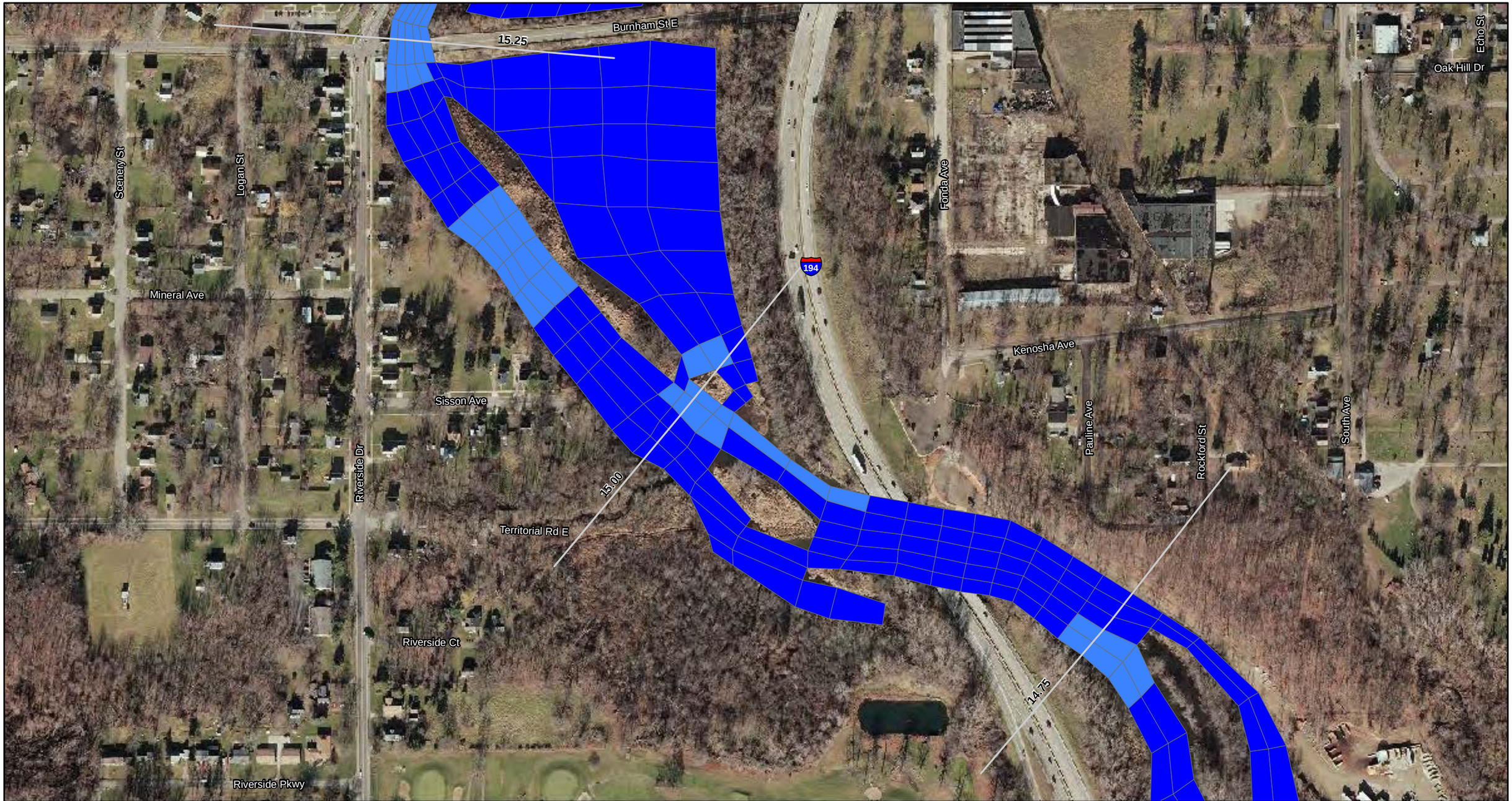
MP 14.00 - MP 14.85

SHEET 17 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

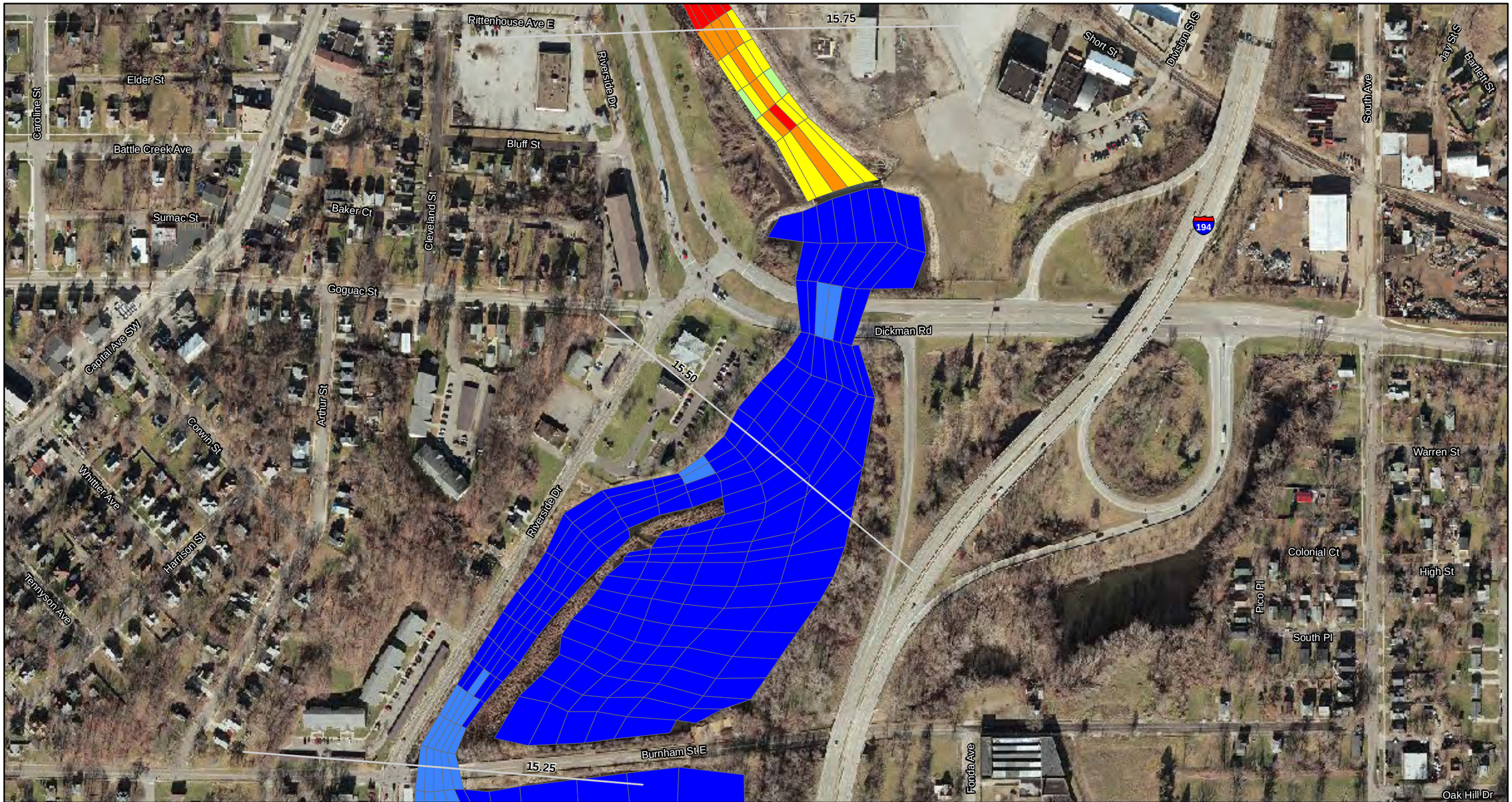
MP 14.65 - MP 15.25

SHEET 18 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

MP 15.25 - MP 15.75

SHEET 19 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep8_2010.mxd

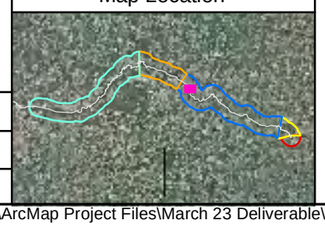
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

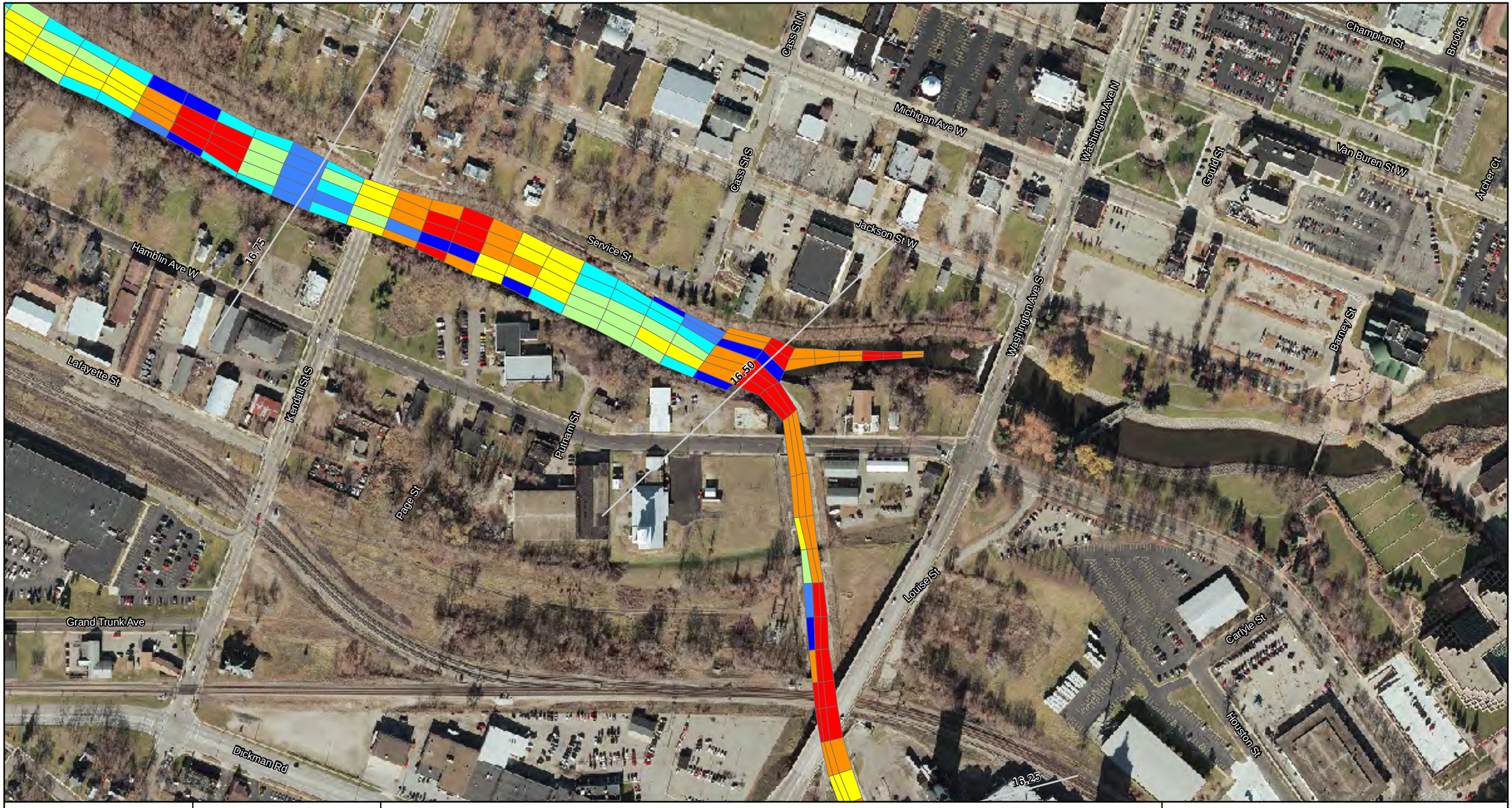
MP 15.75 - MP 16.30

SHEET 20 OF 56

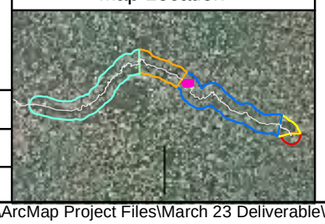
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep8_2010.mxd

Aerial Photography Date: November 2011



Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
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- 5.000001 - 10.000000
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Quarter Mile Grid Segment

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Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

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Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

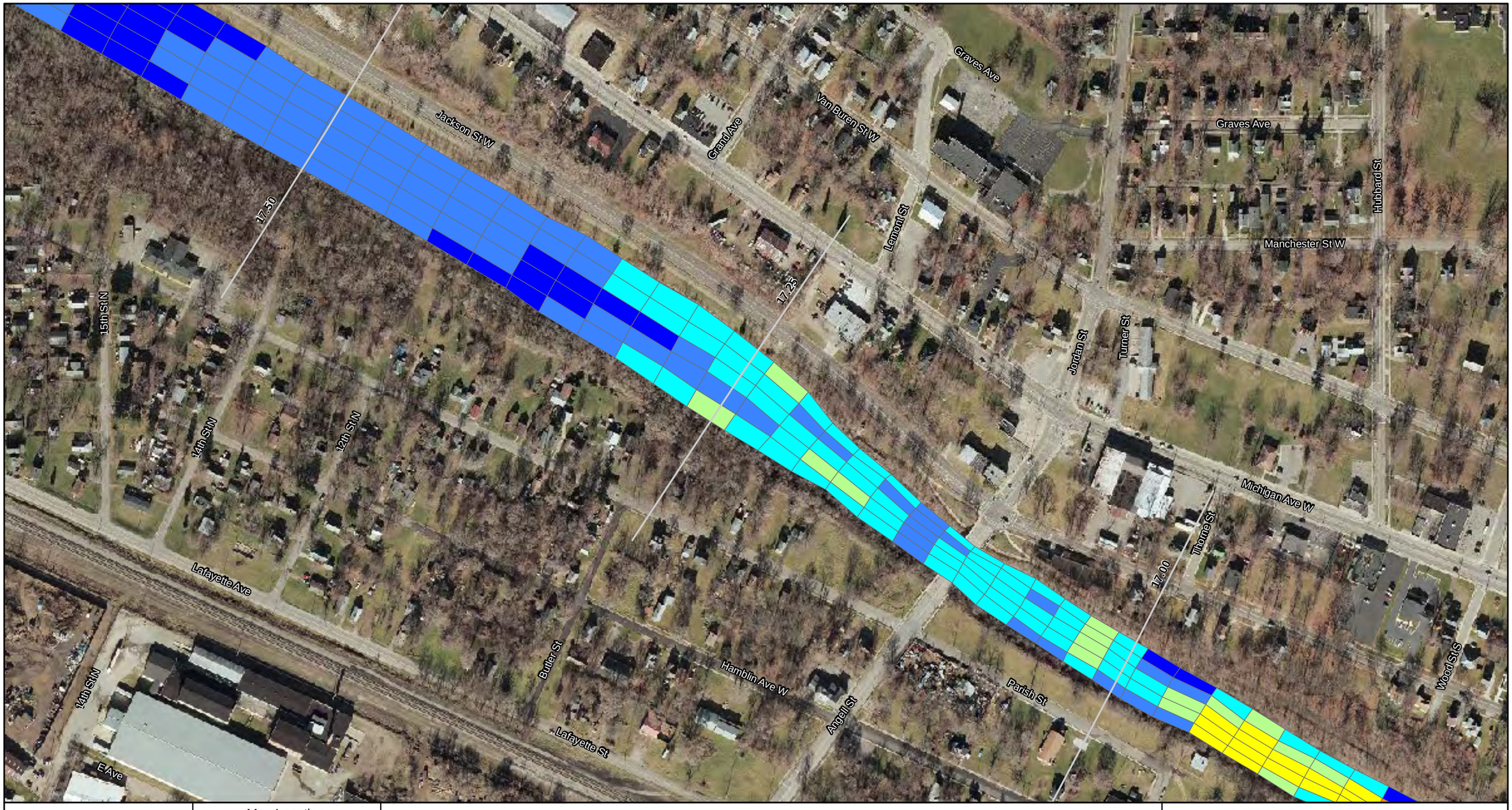
MP 16.30 - MP 16.95

SHEET 21 OF 56

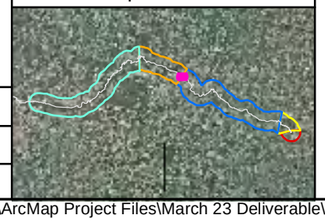
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep8_2010.mxd

Aerial Photography Date: November 2011



Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

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Quarter Mile Grid Segment

Pa = Pascals
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

ENBRIDGE

Drawn:	BRS	3/22/2012
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Project #:	106-4186	

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

MP 16.85 - MP 17.60

SHEET 22 OF 56

ENBRIDGE LINE 6B MP 608
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ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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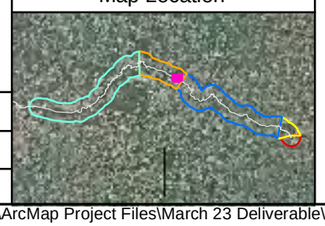
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

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Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

MP 17.60 - MP 18.40

SHEET 23 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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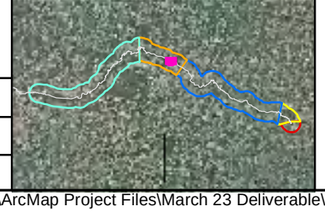
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

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Quarter Mile Grid Segment

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Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

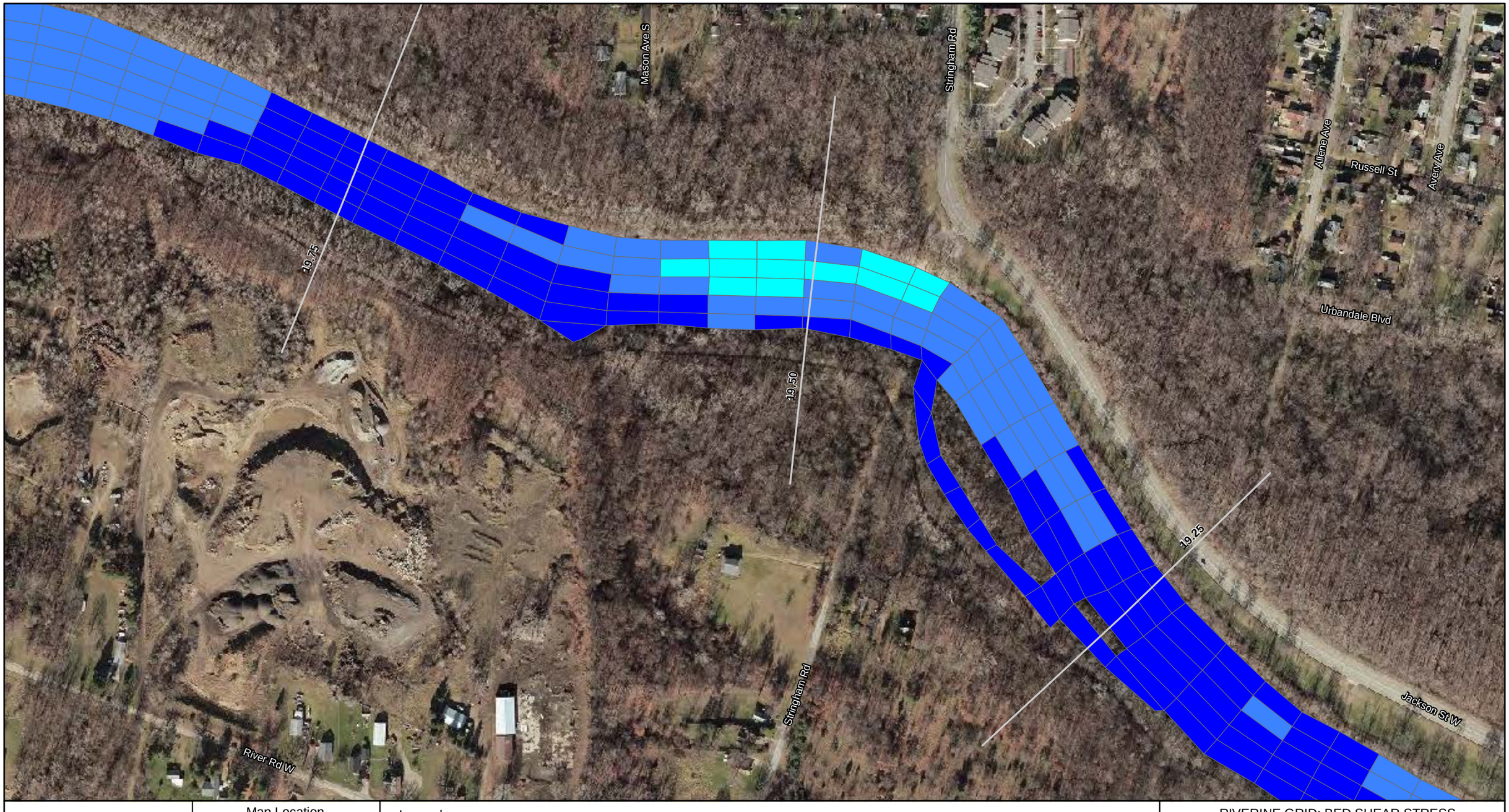
MP 18.30 - MP 19.15

SHEET 24 OF 56

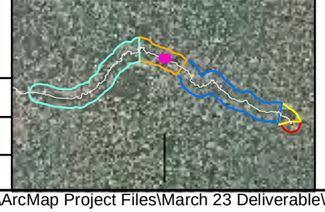
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep8_2010.mxd

Aerial Photography Date: November 2011



Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
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Quarter Mile Grid Segment

Pa = Pascals
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Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

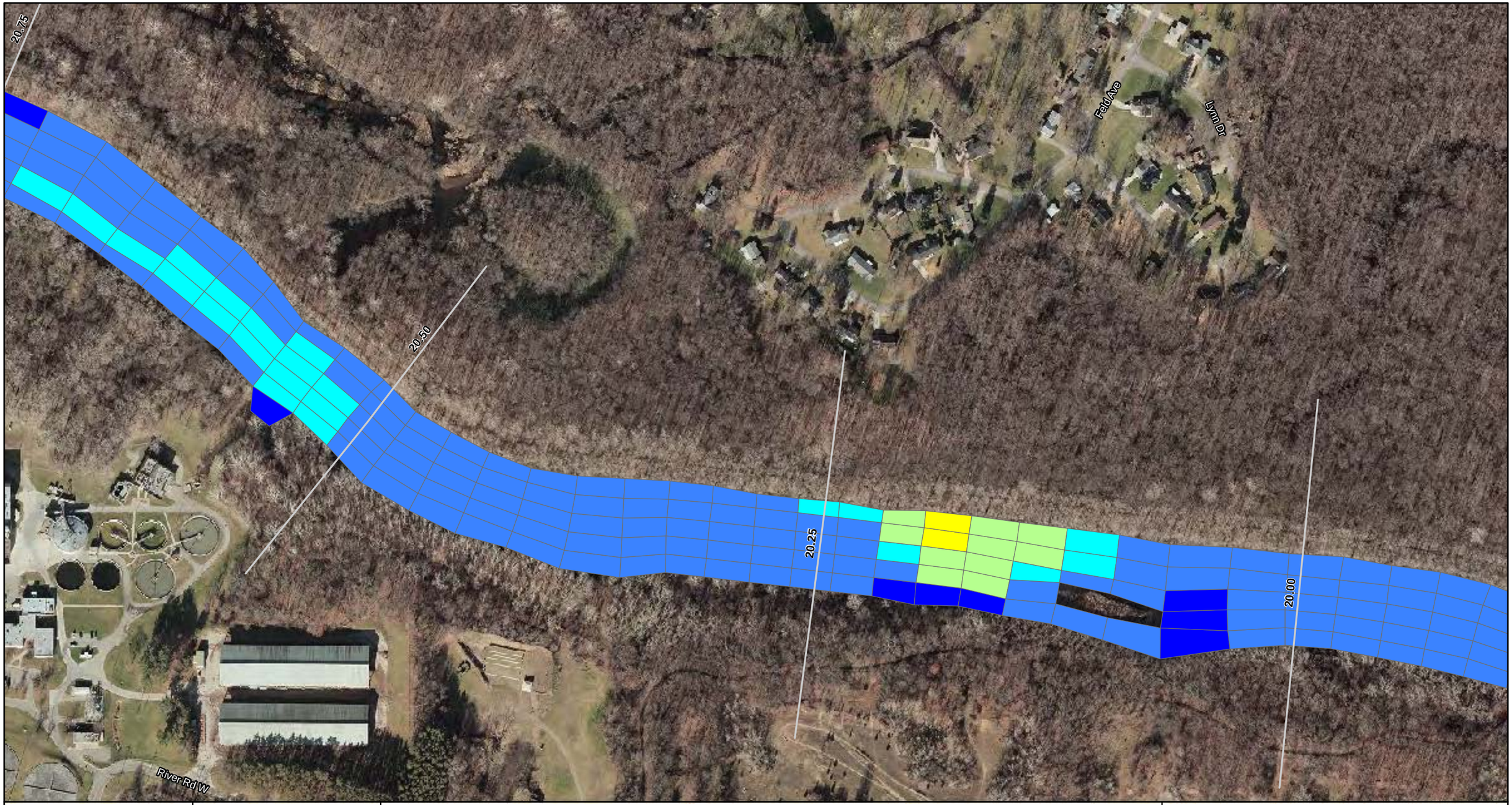
MP 19.10 - MP 19.95

SHEET 25 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep8_2010.mxd

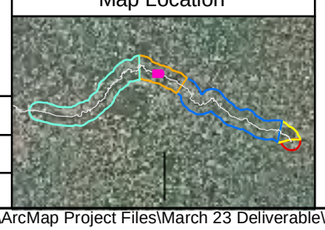
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
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- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

N

0 125 250 500
Scale in Feet

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

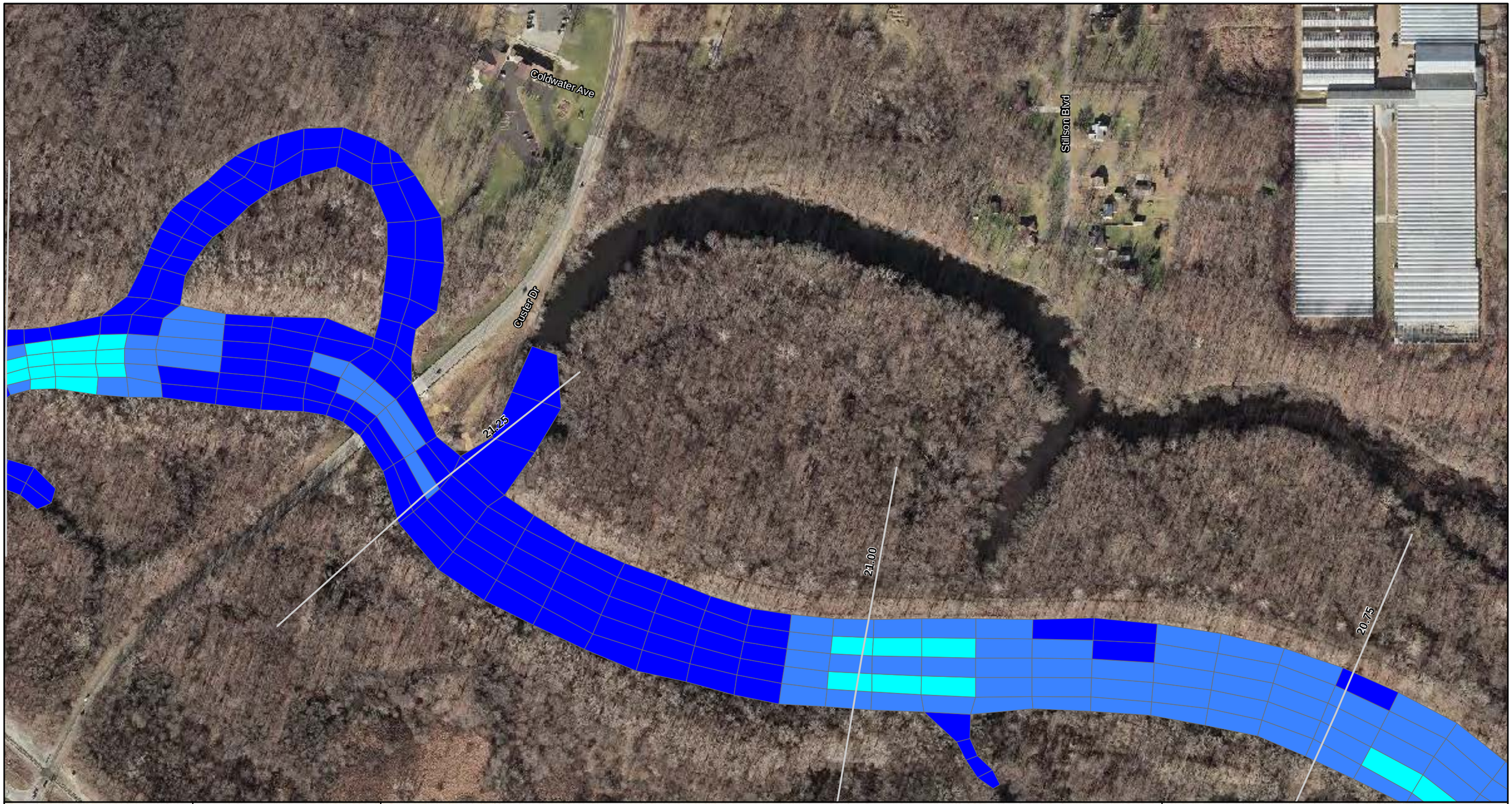
MP 19.90 - MP 20.75

SHEET 26 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
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Aerial Photography Date: November 2011



Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
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- 10.000001 - 20.000000
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Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

MP 20.70 - MP 21.50

SHEET 27 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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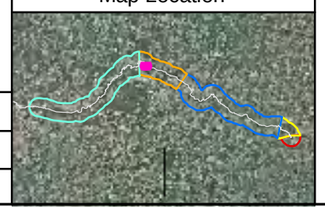
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
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Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

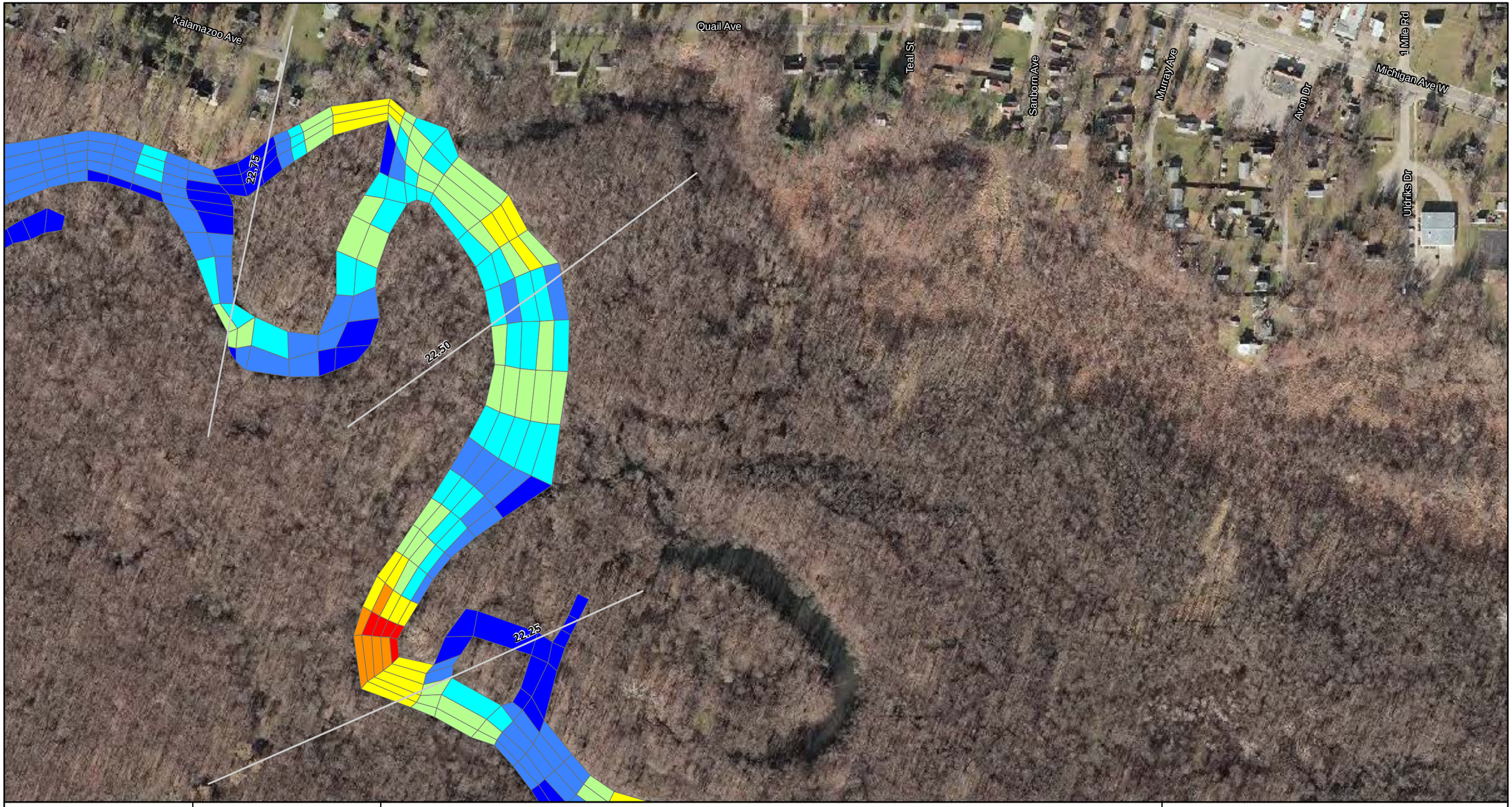
MP 21.35 - MP 22.15

SHEET 28 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep8_2010.mxd

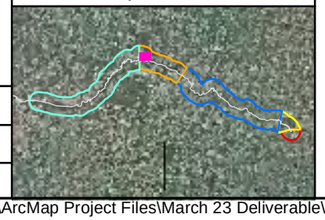
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010
- < 1.000001
- 1.000001 - 2.000000
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Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

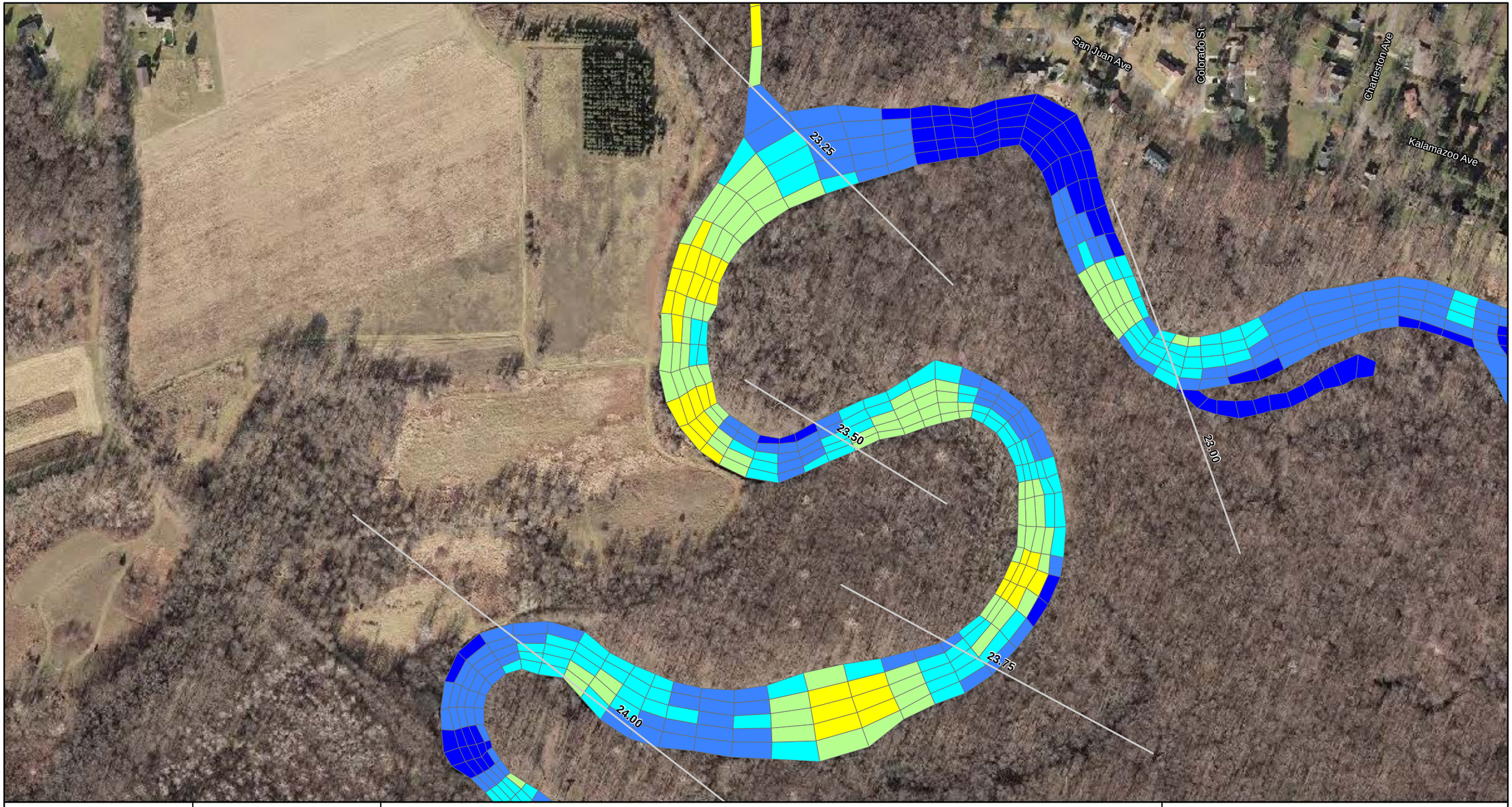
MP 22.15 - MP 22.90

SHEET 29 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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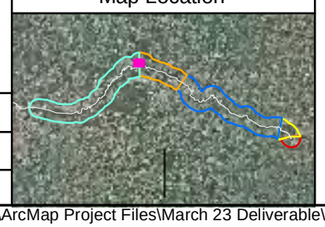
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
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Quarter Mile Grid Segment

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Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

MP 22.80 - MP 24.10

SHEET 30 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
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Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

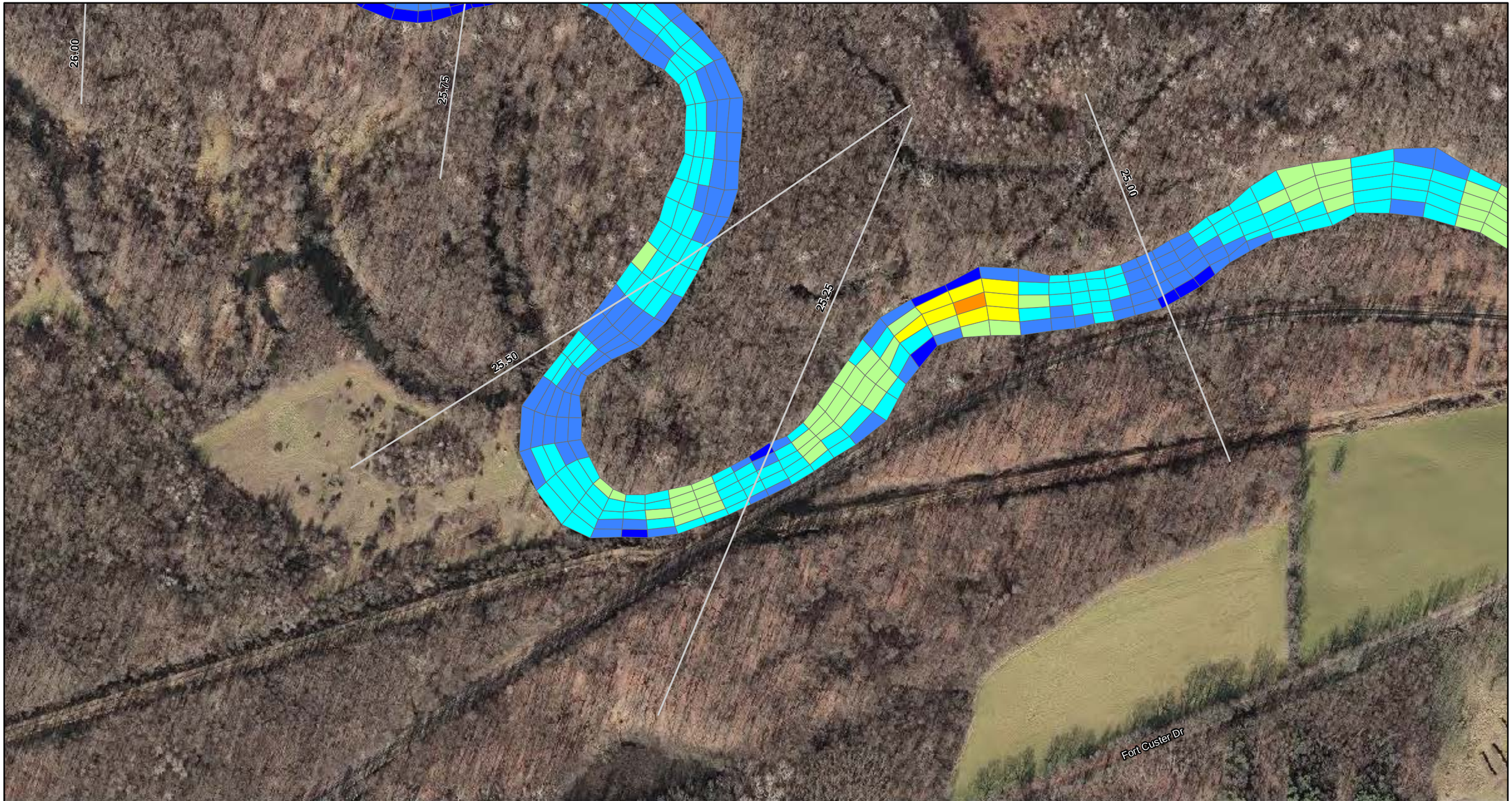
MP 24.10 - MP 24.85

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ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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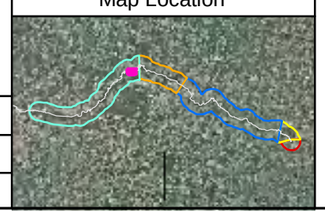
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

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Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

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0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

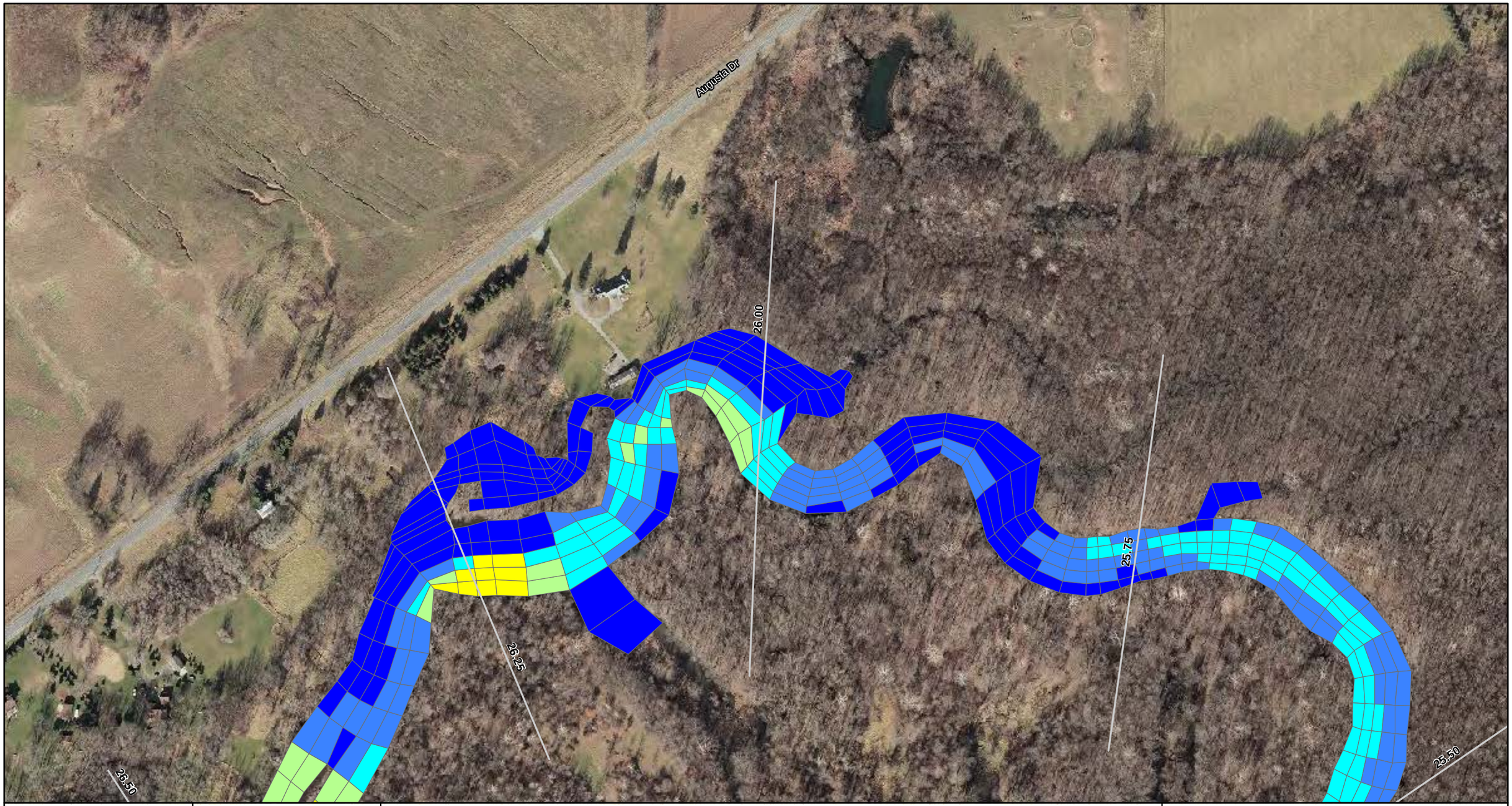
MP 24.80 - MP 25.65

SHEET 32 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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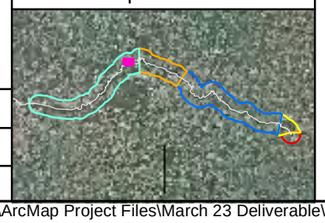
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

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Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

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Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

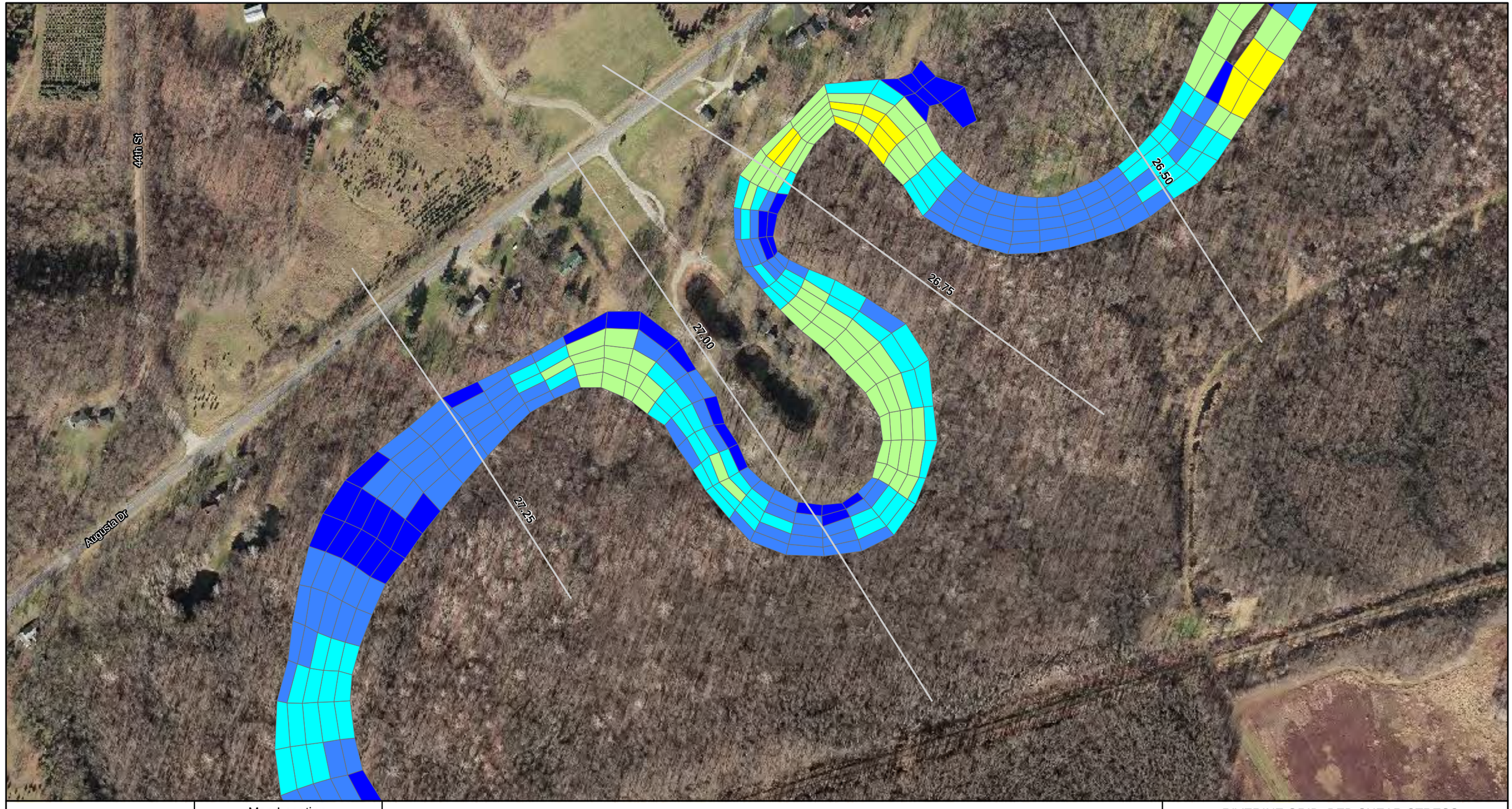
MP 25.55 - MP 26.40

SHEET 33 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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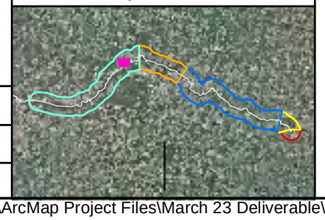
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

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Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

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0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

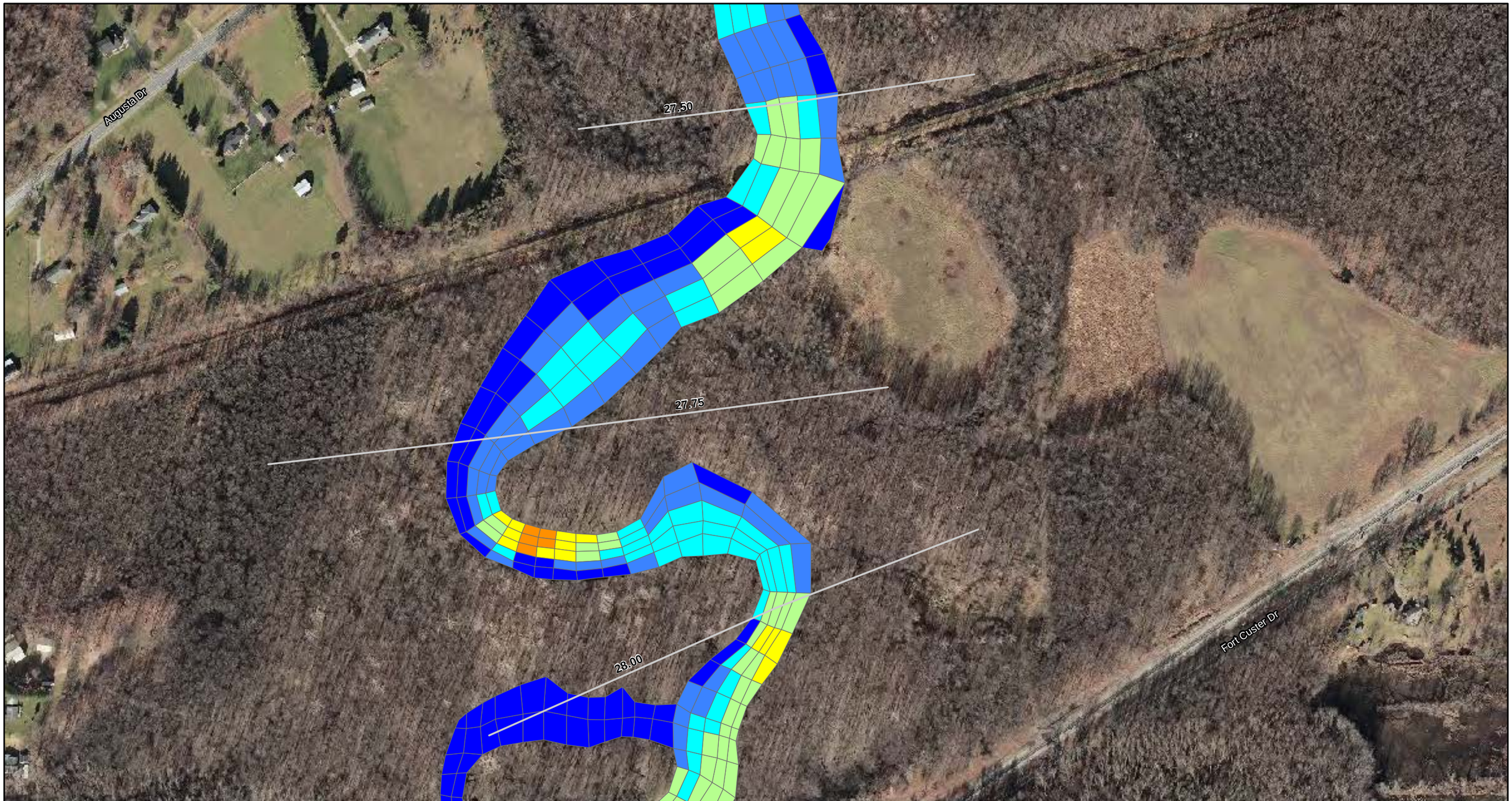
MP 26.40 - MP 27.45

SHEET 34 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

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Project #:	106-4186	

Map Location



Legend

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Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

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Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

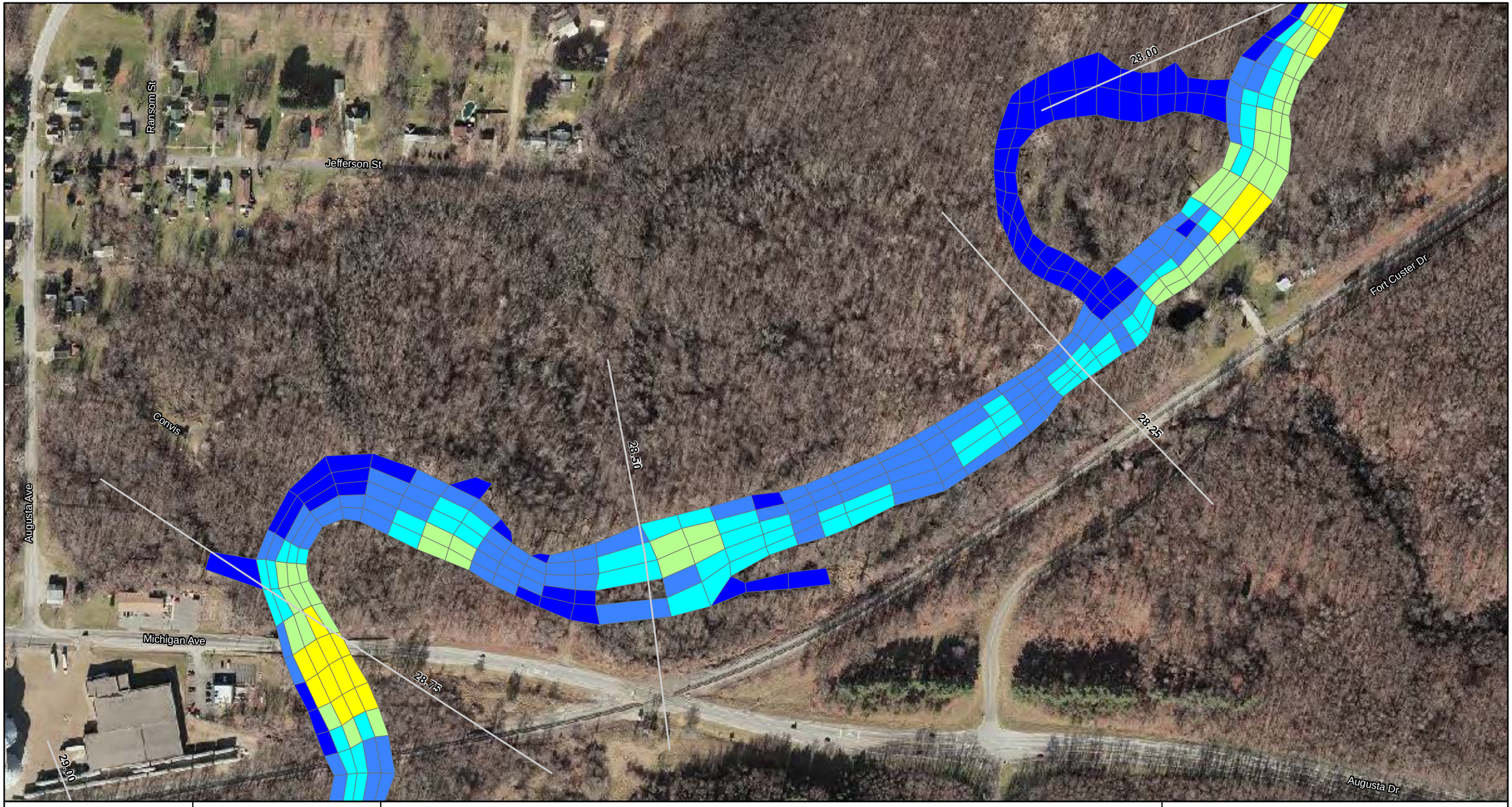
MP 27.45 - MP 28.10

SHEET 35 OF 56

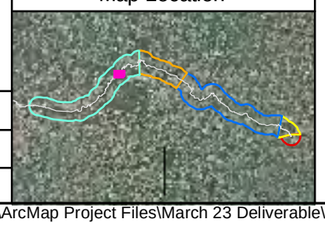
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep8_2010.mxd

Aerial Photography Date: November 2011



Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

MP 28.05 - MP 28.85

SHEET 36 OF 56

ENBRIDGE LINE 6B MP 608
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ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

Clinton St
Clinton St
Chestnut St
Webster St
Church St
Fayette St
Cass St
Cherry St
Lincoln St
28.75
29.00
29.25
29.50
Augusta Climax Rd
Fort Custer Rec Area Access

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

MP 28.85 - MP29.55

SHEET 37 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep8_2010.mxd

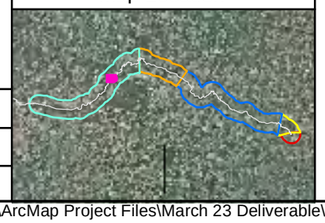
Aerial Photography Date: November 2011

29.50
29.75
30.00
30.25
Fort Custer Rec Area Service
Fort Custer Rec Area Access

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

MP 29.50 - MP29.95

SHEET 38 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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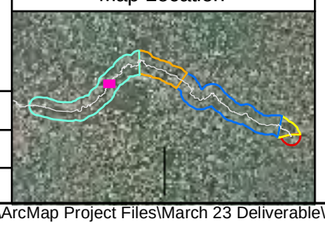
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

MP 29.95 - MP 30.80

SHEET 39 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

30.75

31.00

31.25

Bicycle Trail

Fort Custer Rec Area Access

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

MP 30.75 - MP 31.25

SHEET 40 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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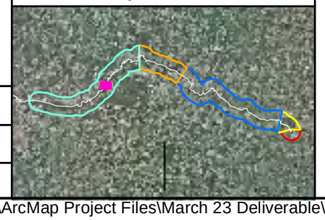
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

MP 31.25 - MP 31.70

SHEET 41 OF 56

ENBRIDGE LINE 6B MP 608
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ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

31.75

32.00

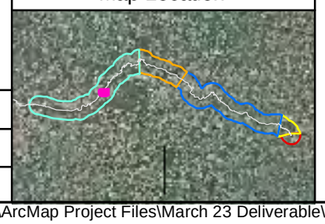
32.25

Bicycle Trail

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

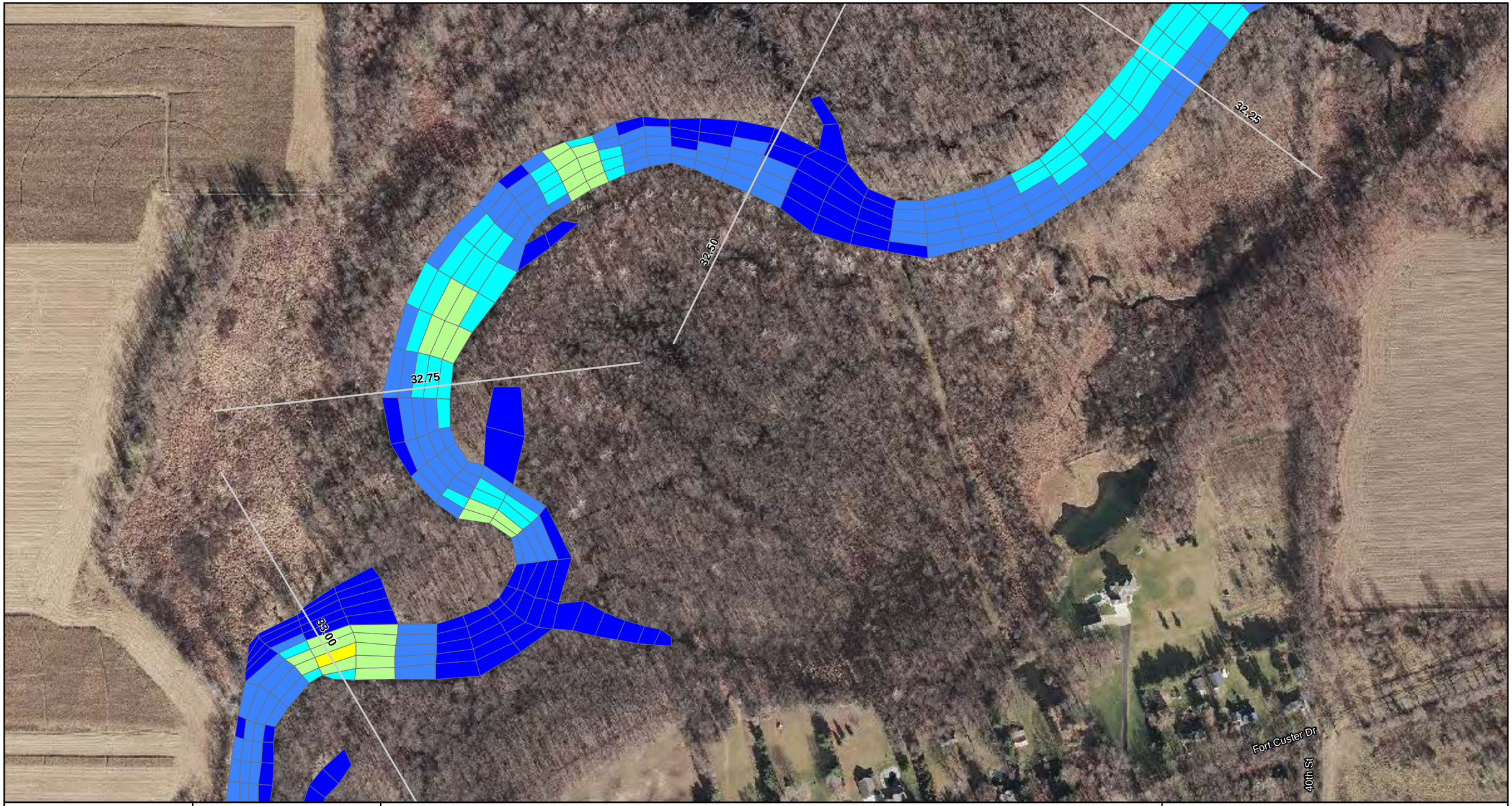
MP 31.65 - MP 32.25

SHEET 42 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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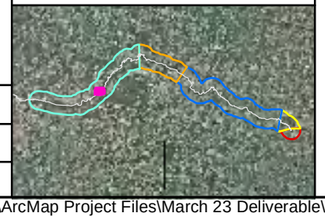
Aerial Photography Date: November 2011



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Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

MP 32.25 - MP 33.10

SHEET 43 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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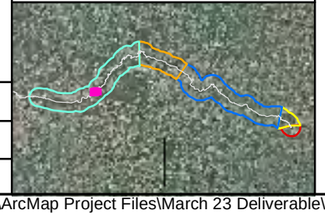
Aerial Photography Date: November 2011

33.00
33.25
33.50
33.75
Fort Custer Dr

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

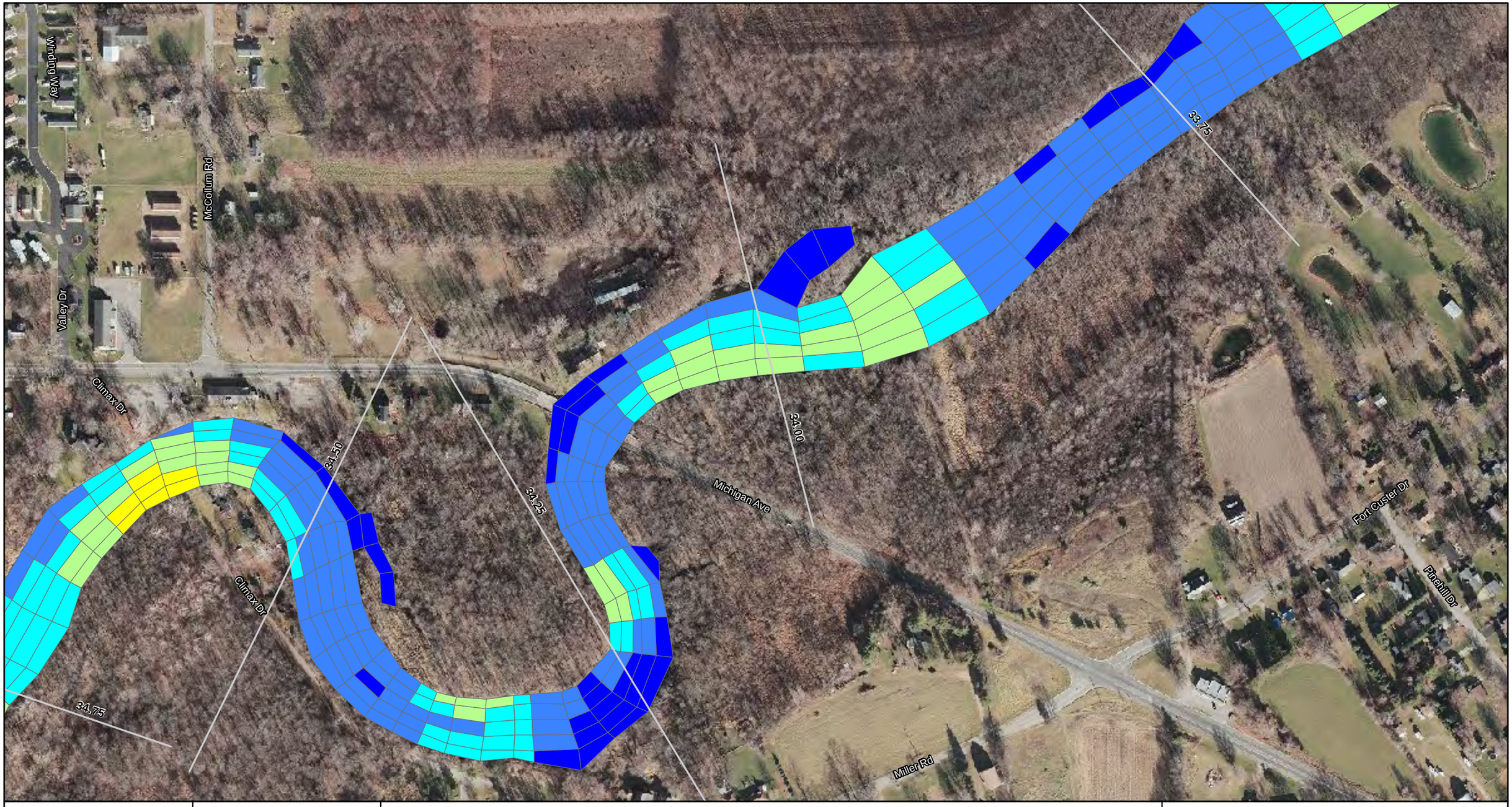
MP 33.10 - MP 33.70

SHEET 44 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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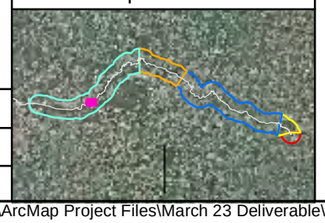
Aerial Photography Date: November 2011



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Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

MP 33.70 - MP 34.70

SHEET 45 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

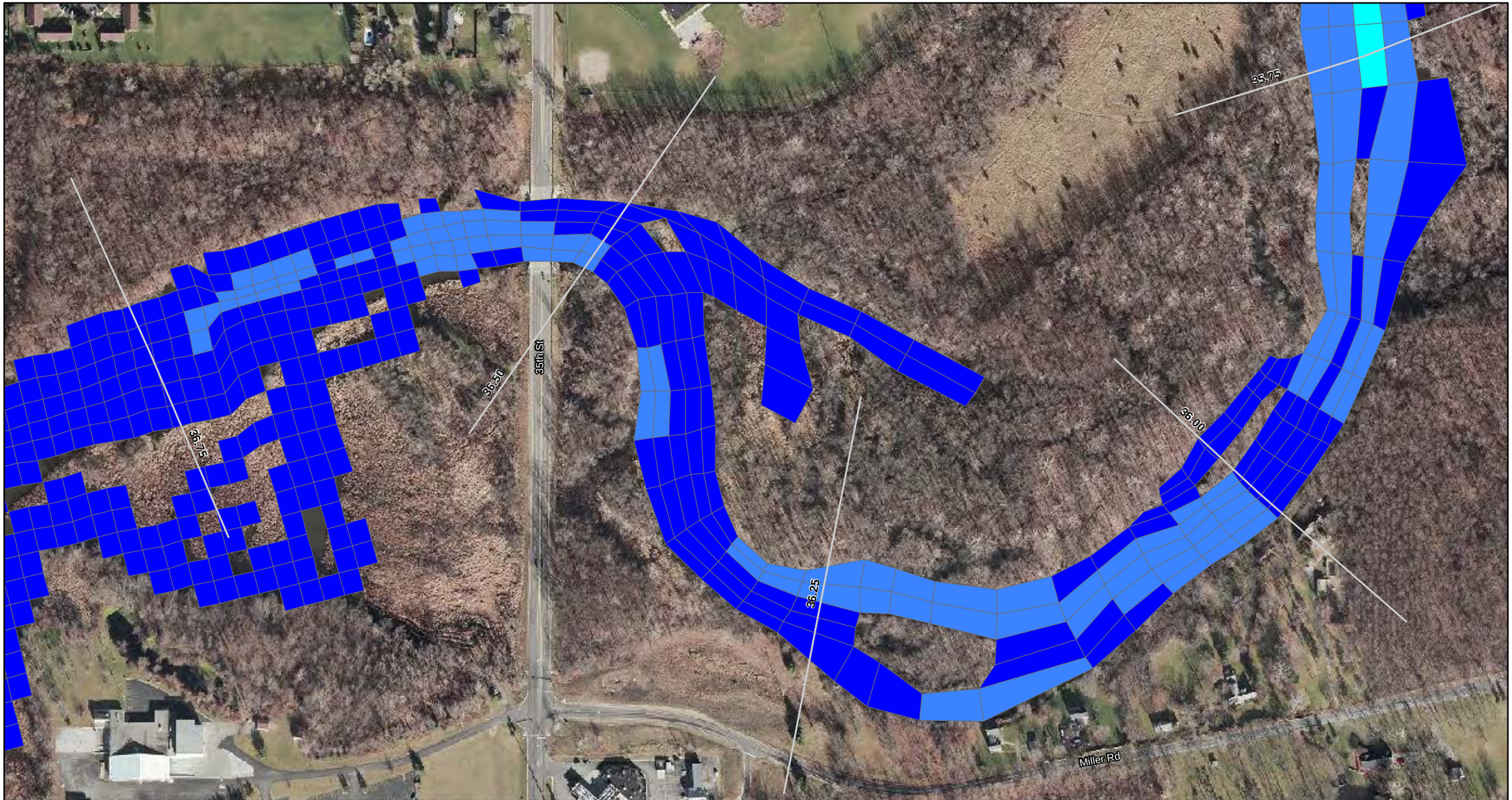
MP 34.70 - MP 35.75

SHEET 46 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

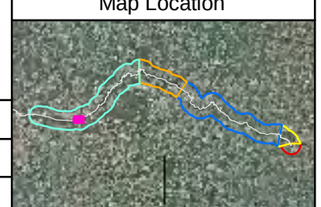
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep8_2010.mxd

Aerial Photography Date: November 2011



Drawn:	BRS 3/22/2012
Approved:	DBR 3/22/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

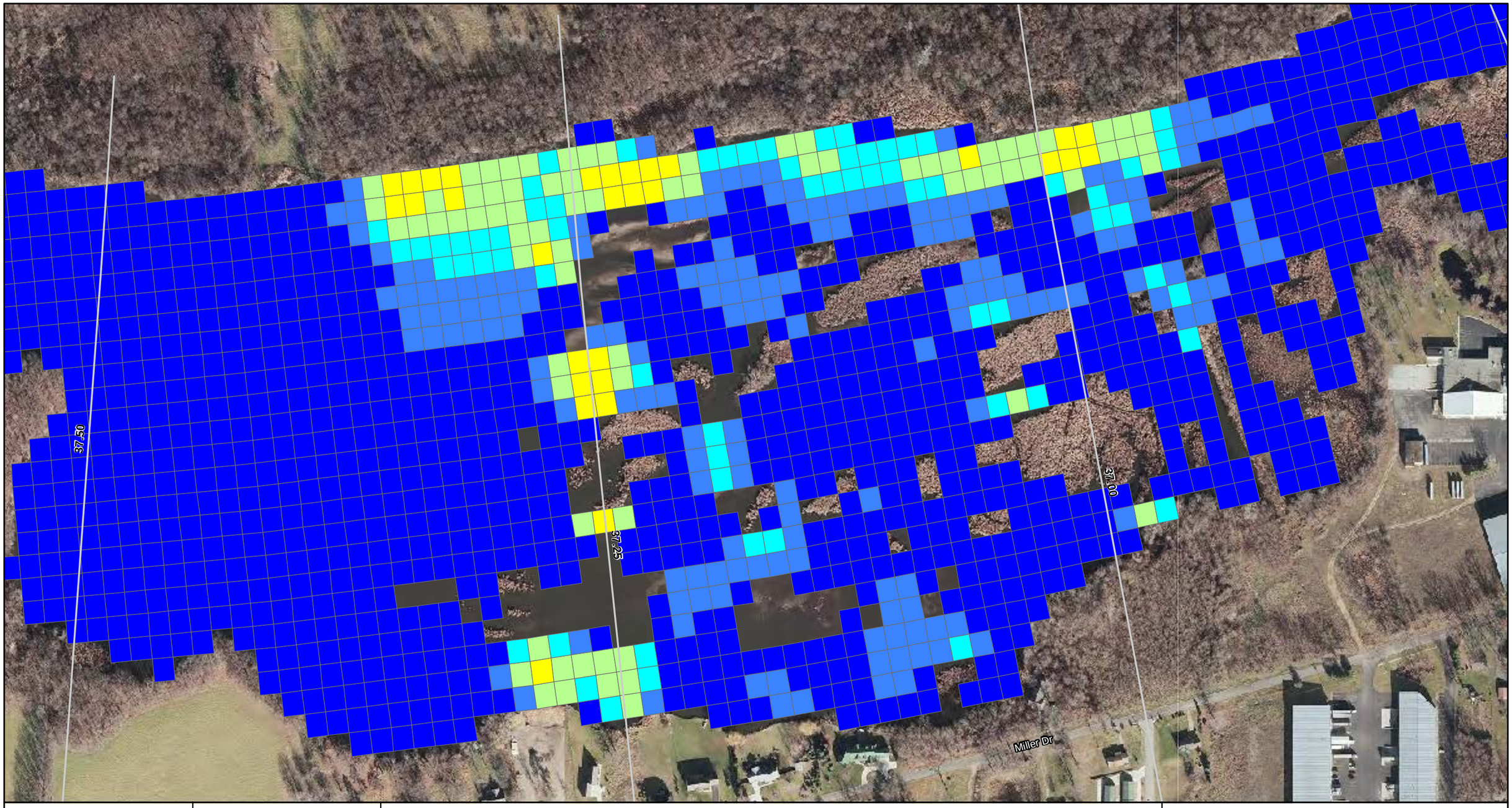
MP 35.75 - MP 36.80

SHEET 47 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

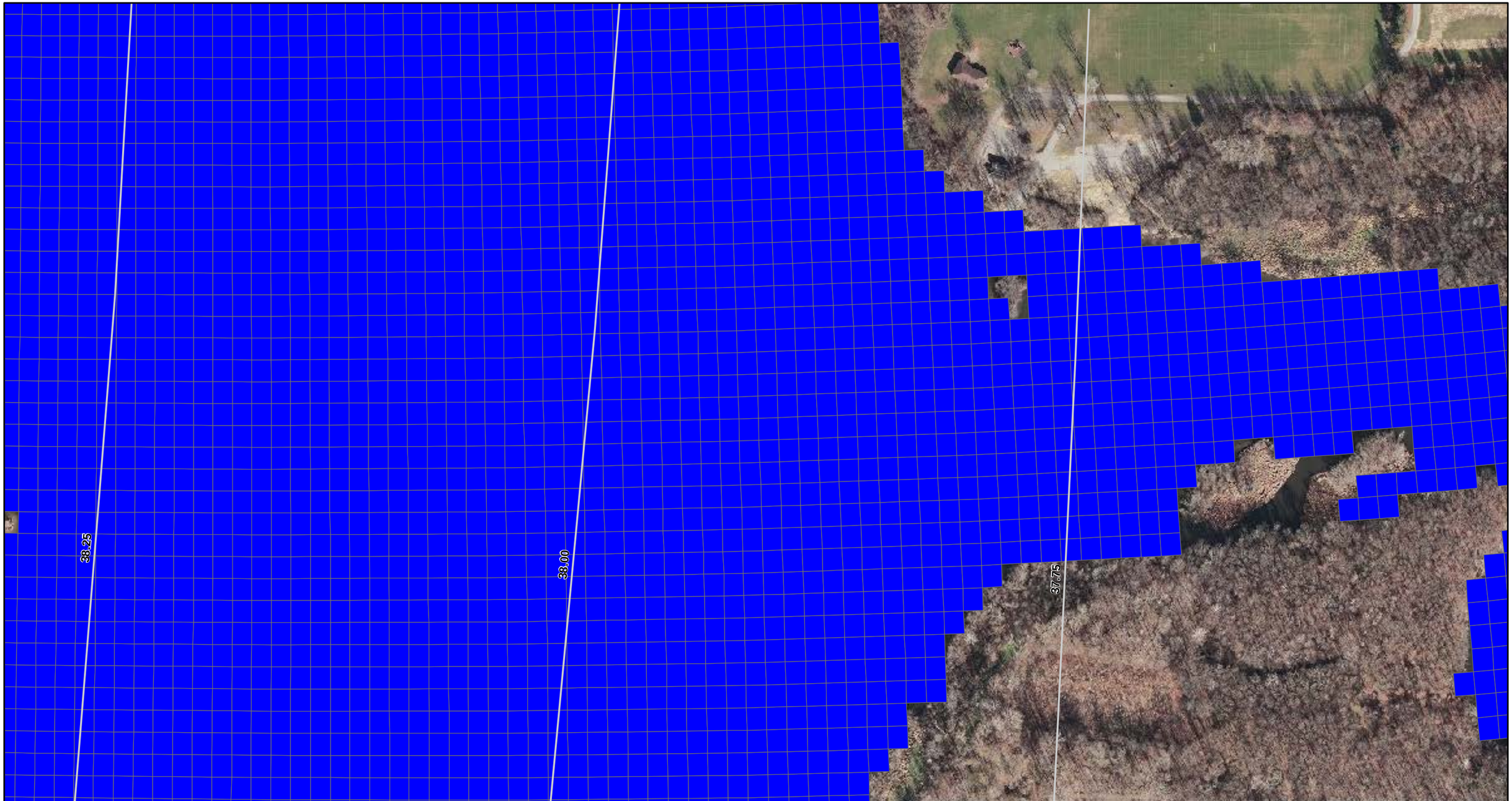
MP 36.80 - MP 37.55

SHEET 48 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep8_2010.mxd

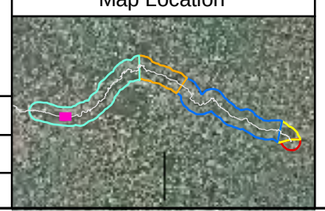
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

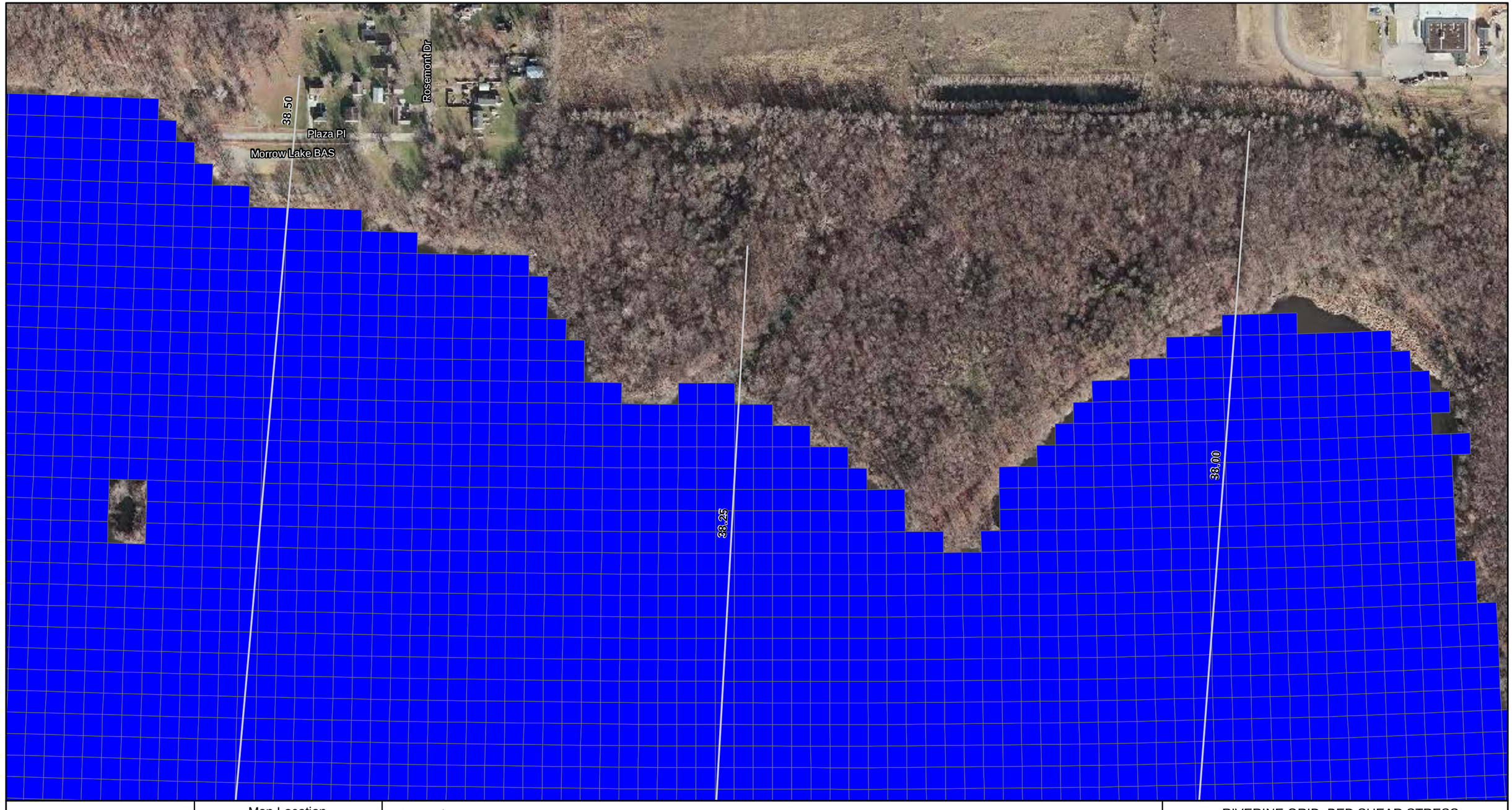
MP 37.55 - MP 38.30

SHEET 49 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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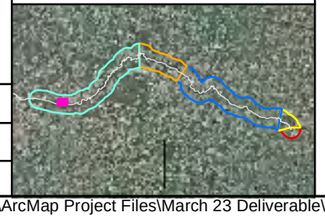
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

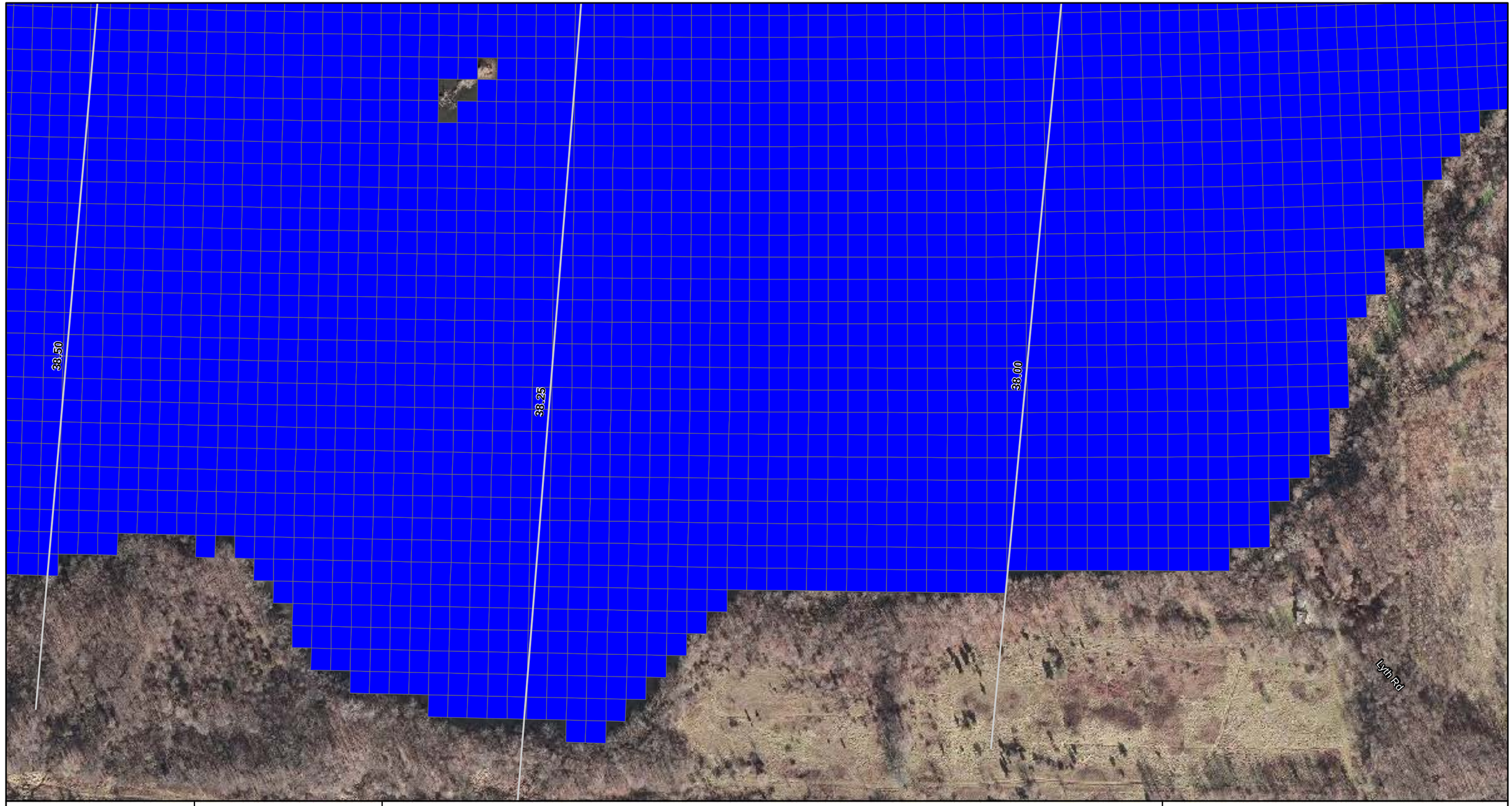
MP 37.80 - MP 38.60N

SHEET 50 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep8_2010.mxd

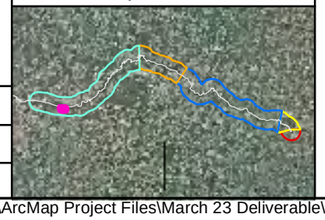
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

MP 37.80 - MP 38.60S

SHEET 51 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

39.00

38.50

38.75

38.25

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

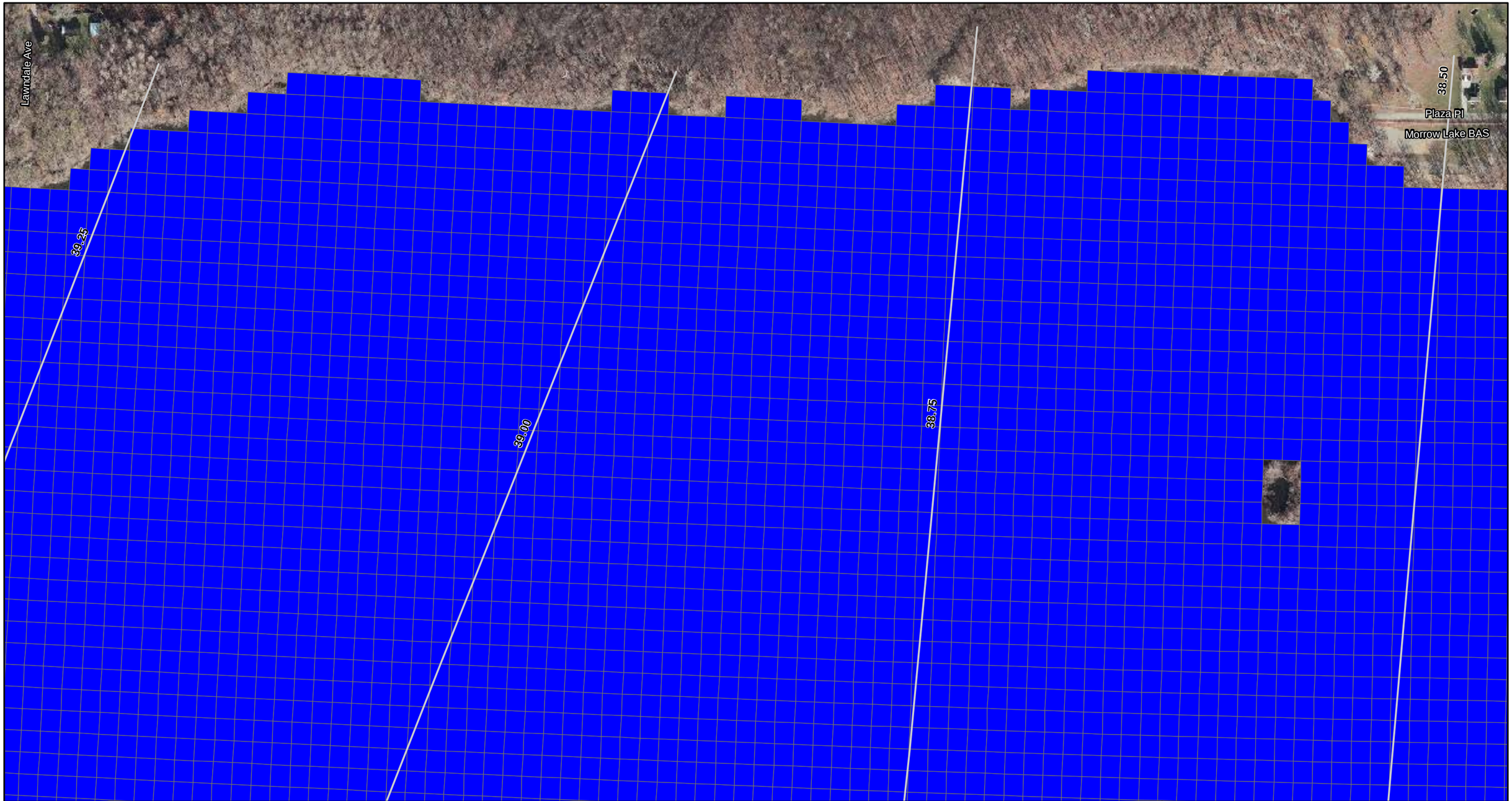
MP 38.25 - MP 39.00C

SHEET 52 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep8_2010.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

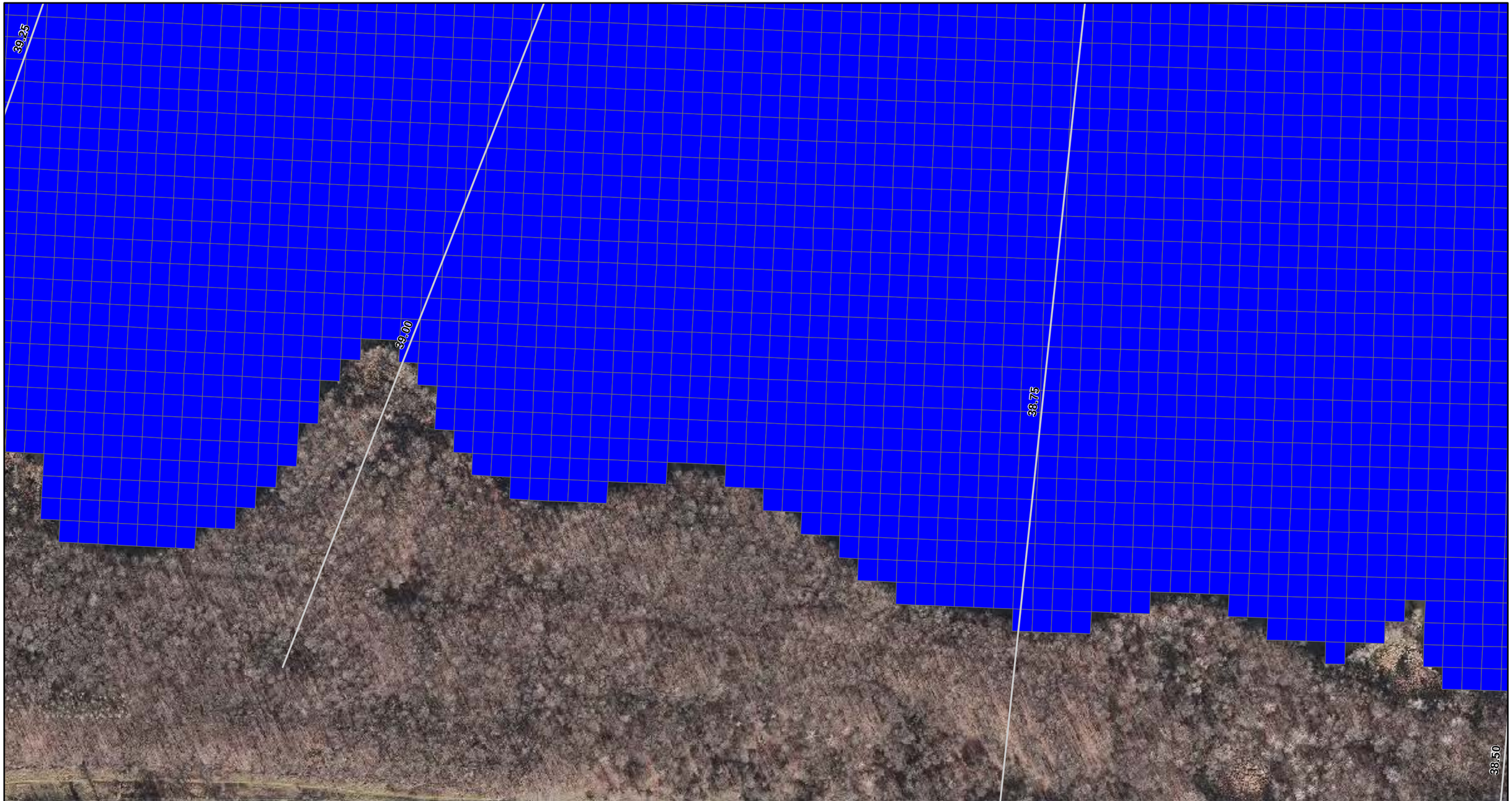
MP 38.50 - MP 39.25N

SHEET 53 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep8_2010.mxd

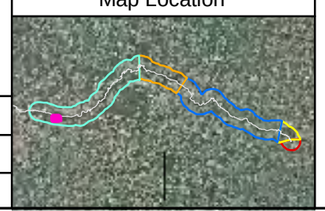
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
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- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

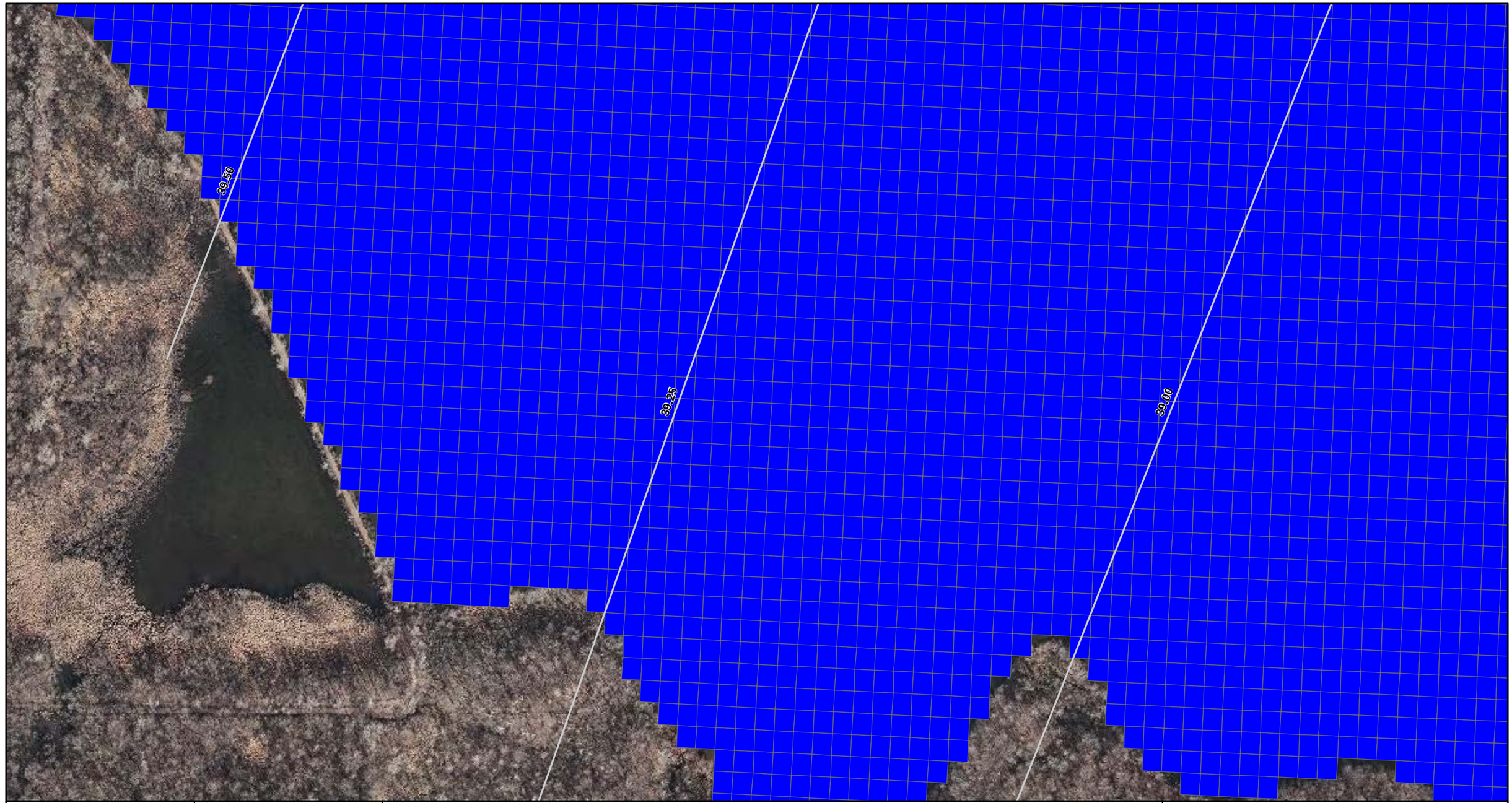
MP 38.50 - MP 39.25S

SHEET 54 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep8_2010.mxd

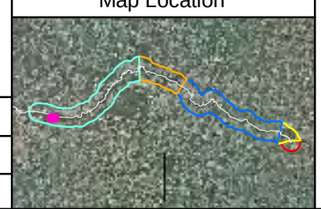
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

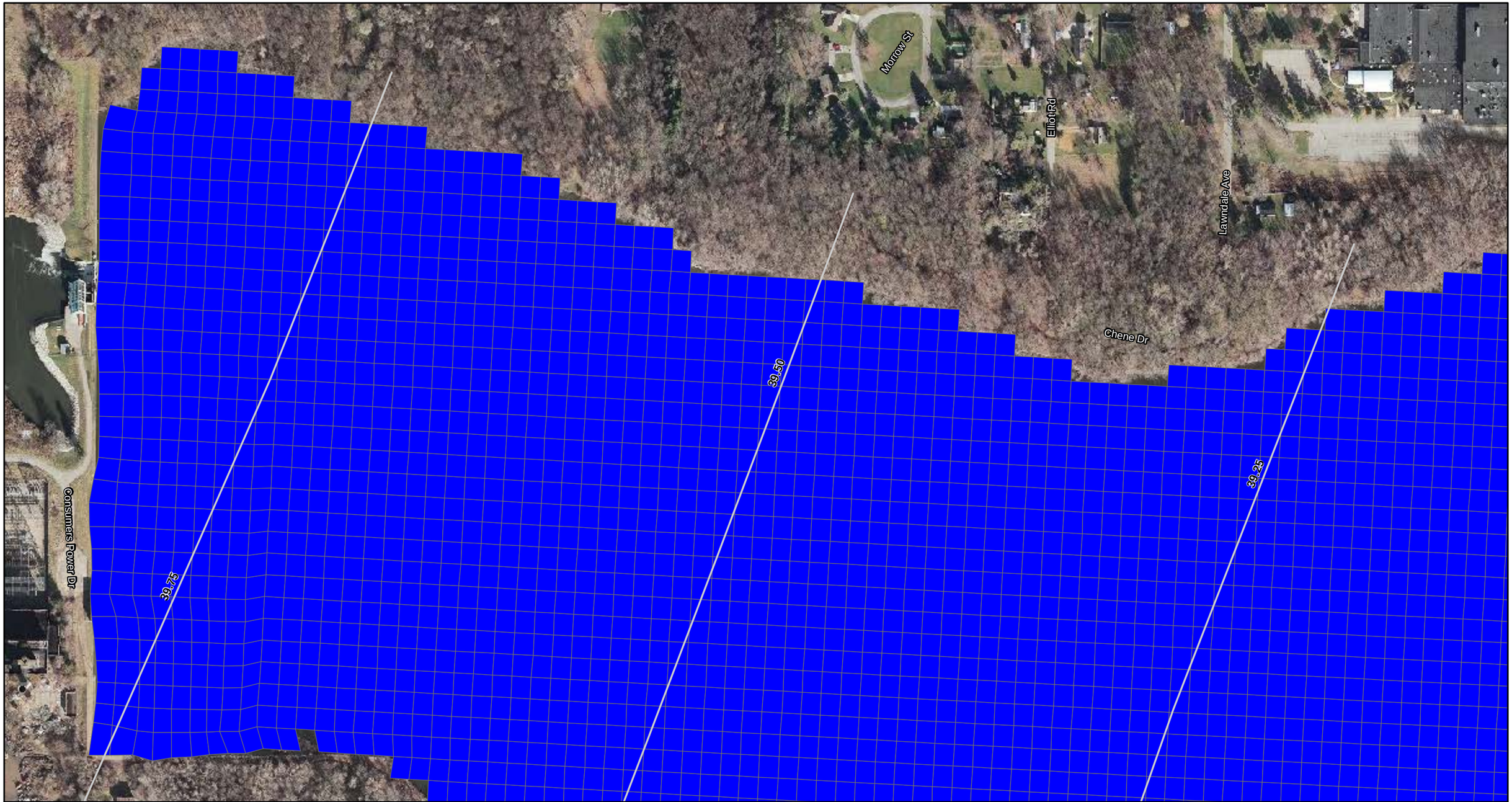
MP 38.90 - MP 39.60S

SHEET 55 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep8_2010.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 8, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 480 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 8, 2010

MP 39.15 - MP 39.85

SHEET 56 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep8_2010.mxd

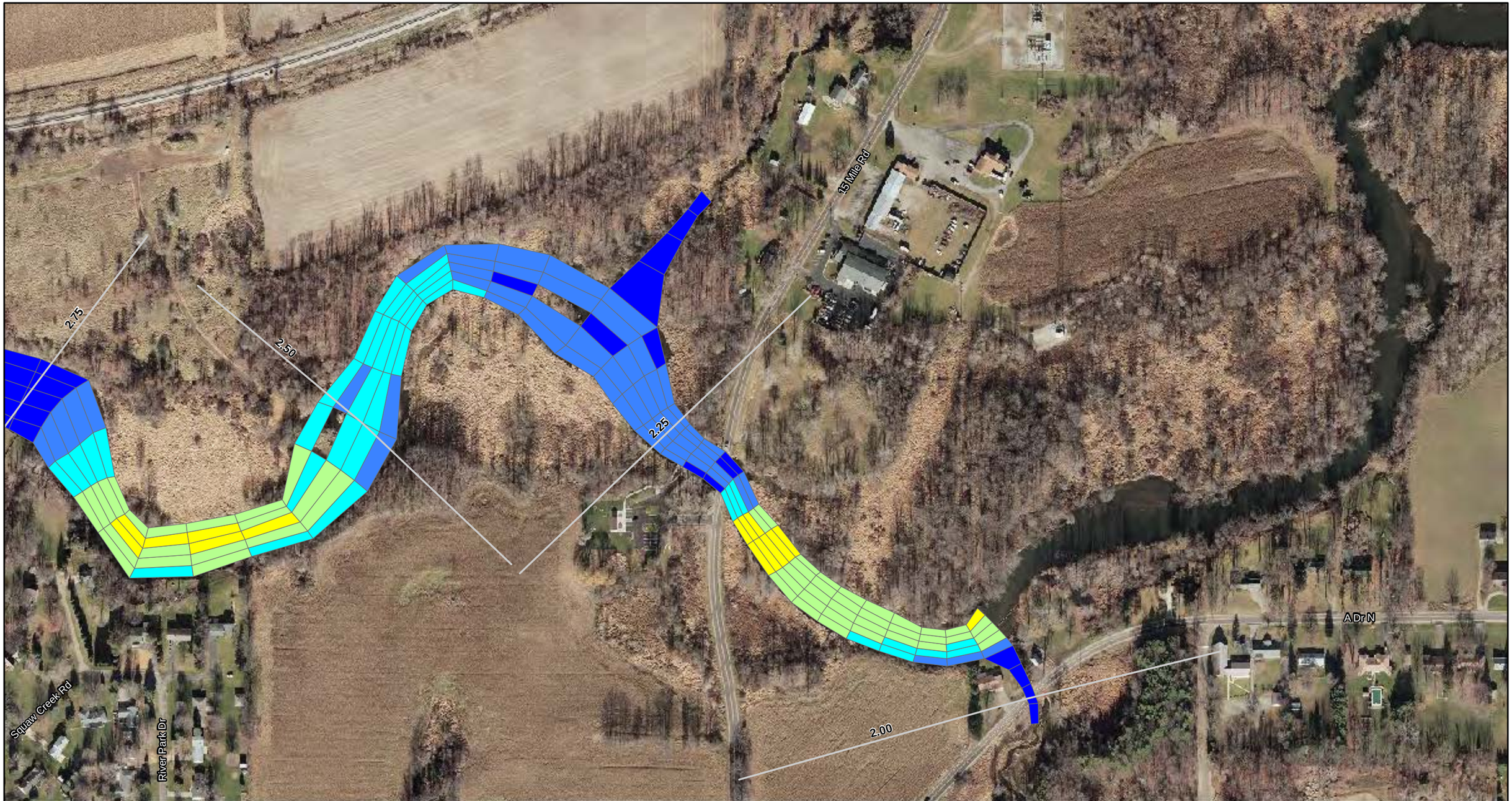
Aerial Photography Date: November 2011

Figure 6-7

Riverine Grid: Bed Shear Stress

September 9, 2010

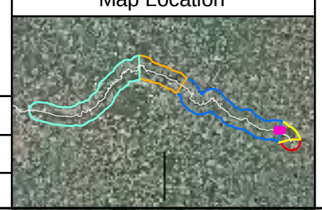
Sheets 1 through 56



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

MP 01.95 - MP 02.75

SHEET 1 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

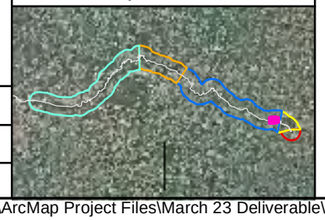
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

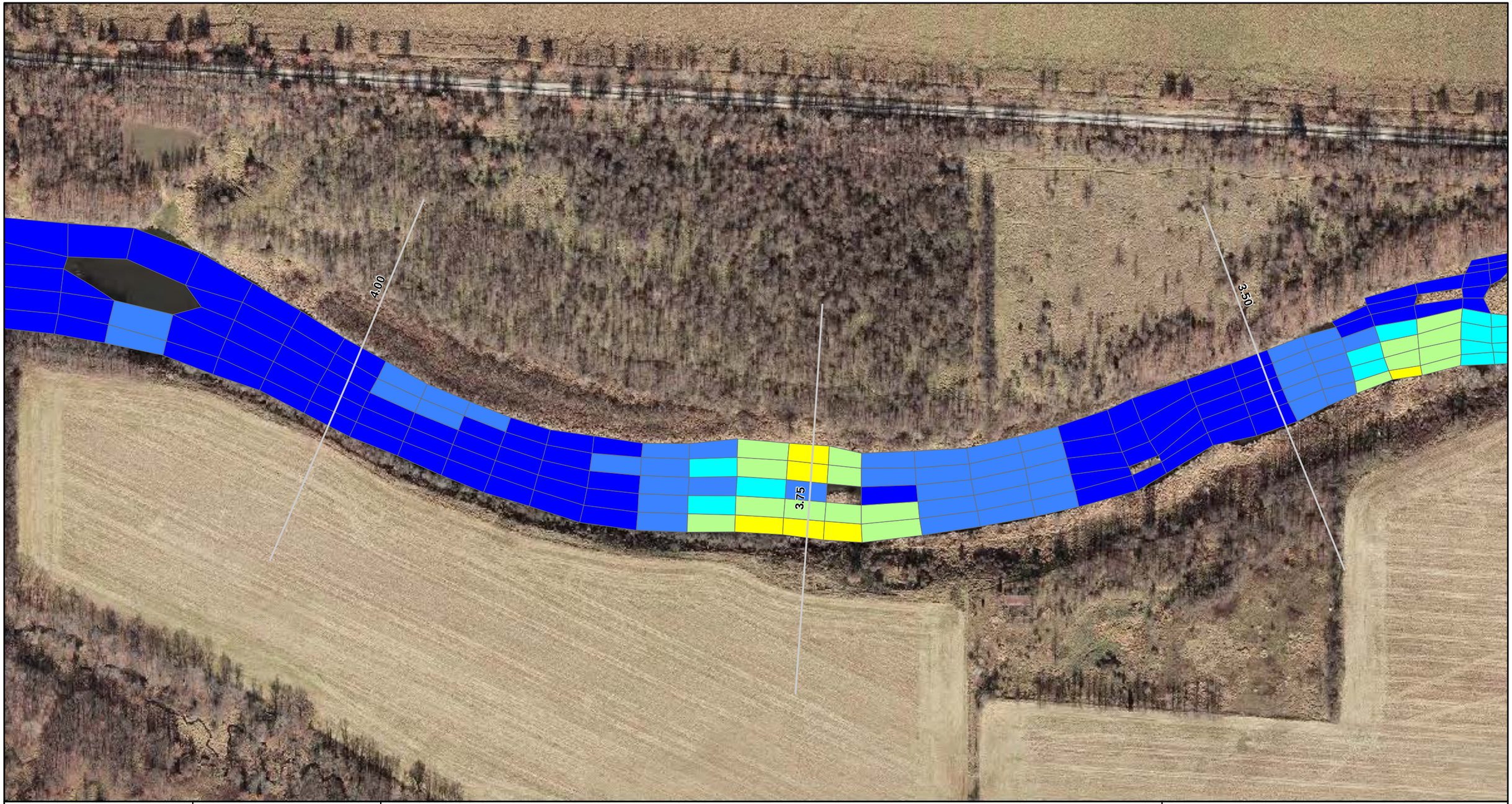
MP 02.60 - MP 03.40

SHEET 2 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

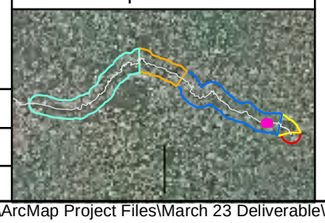
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

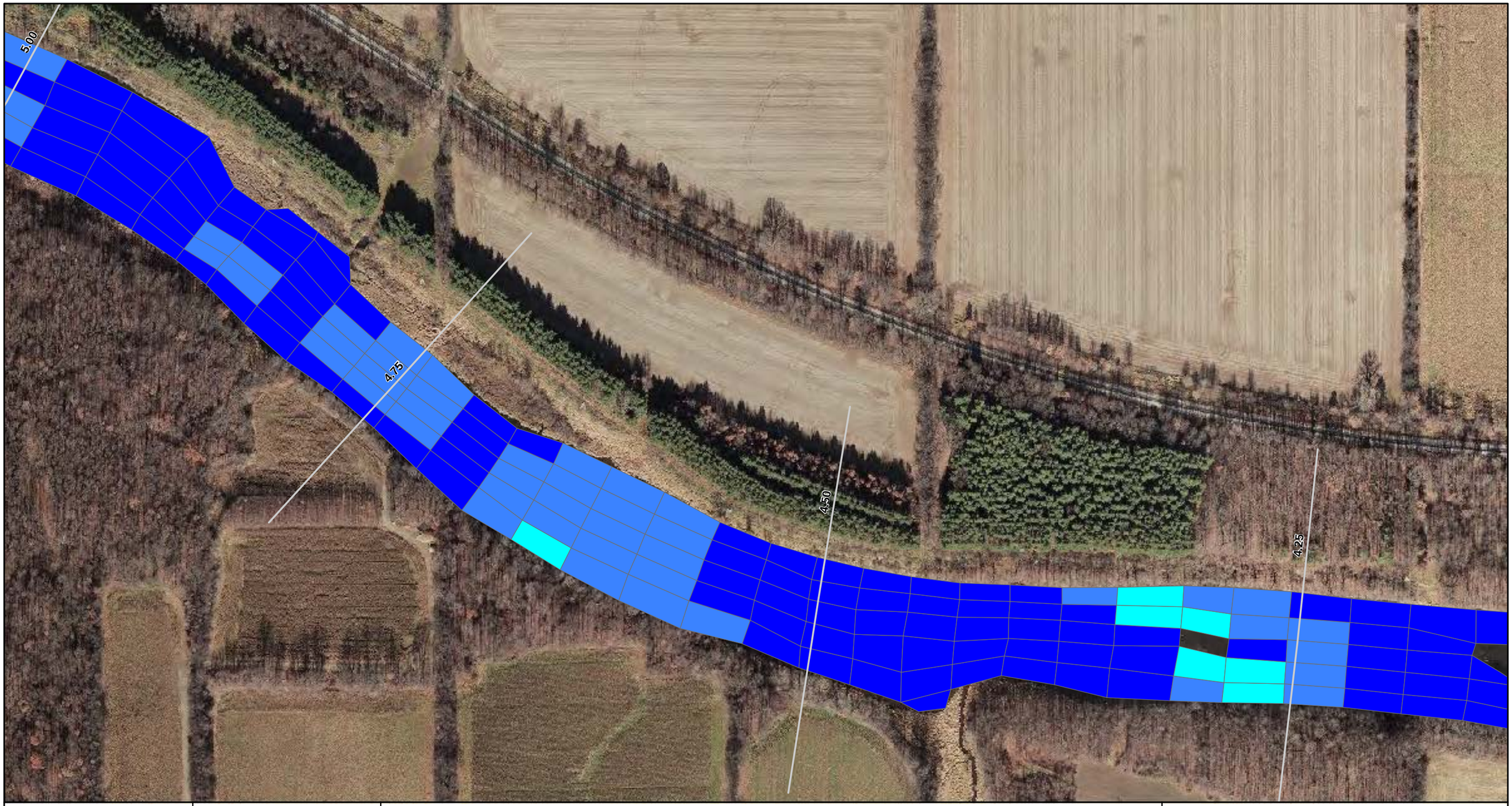
MP 03.40 - MP 04.20

SHEET 3 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

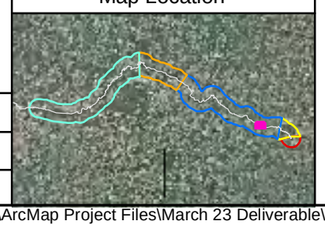
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

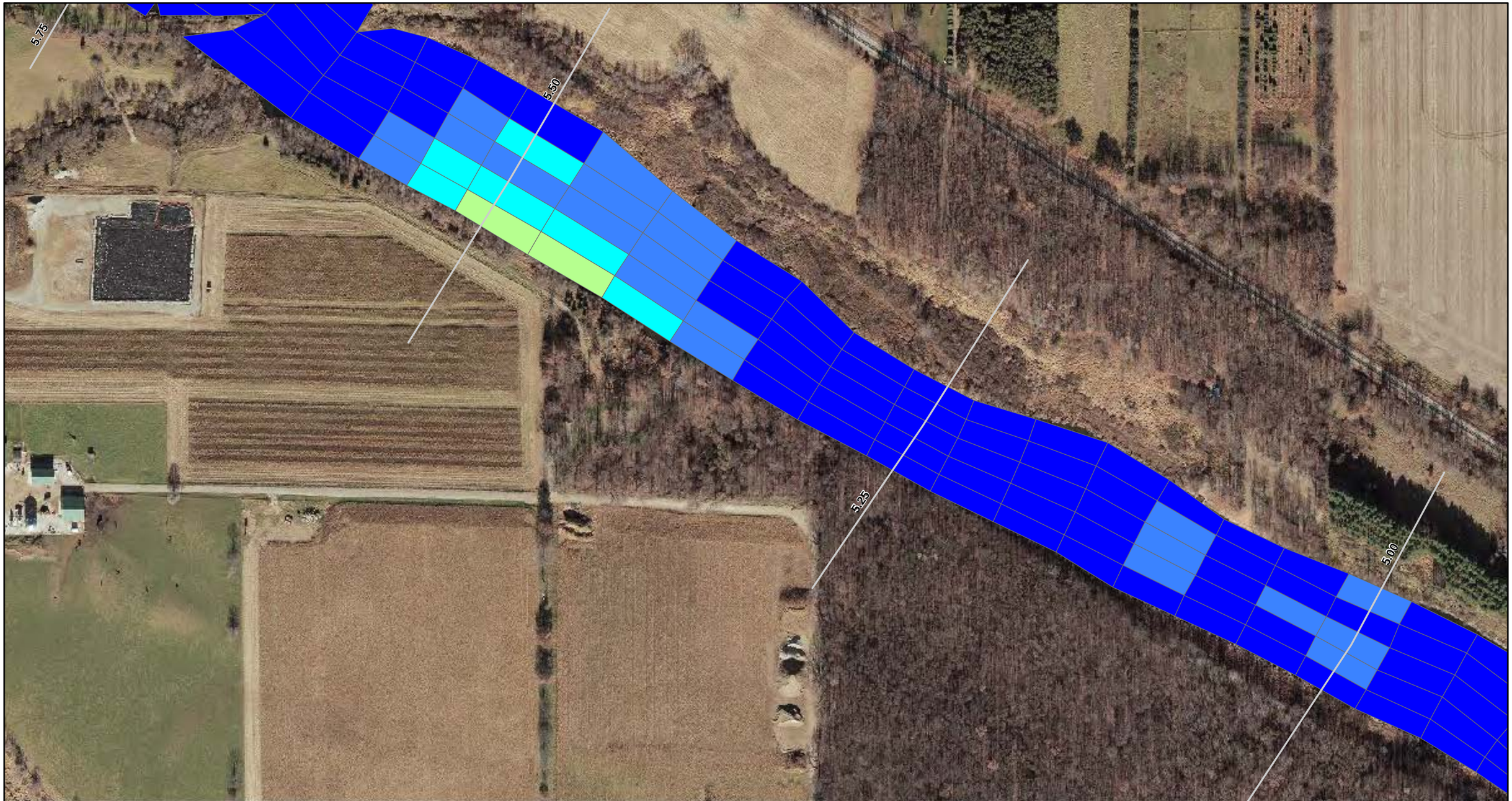
MP 04.15 - MP 05.00

SHEET 4 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

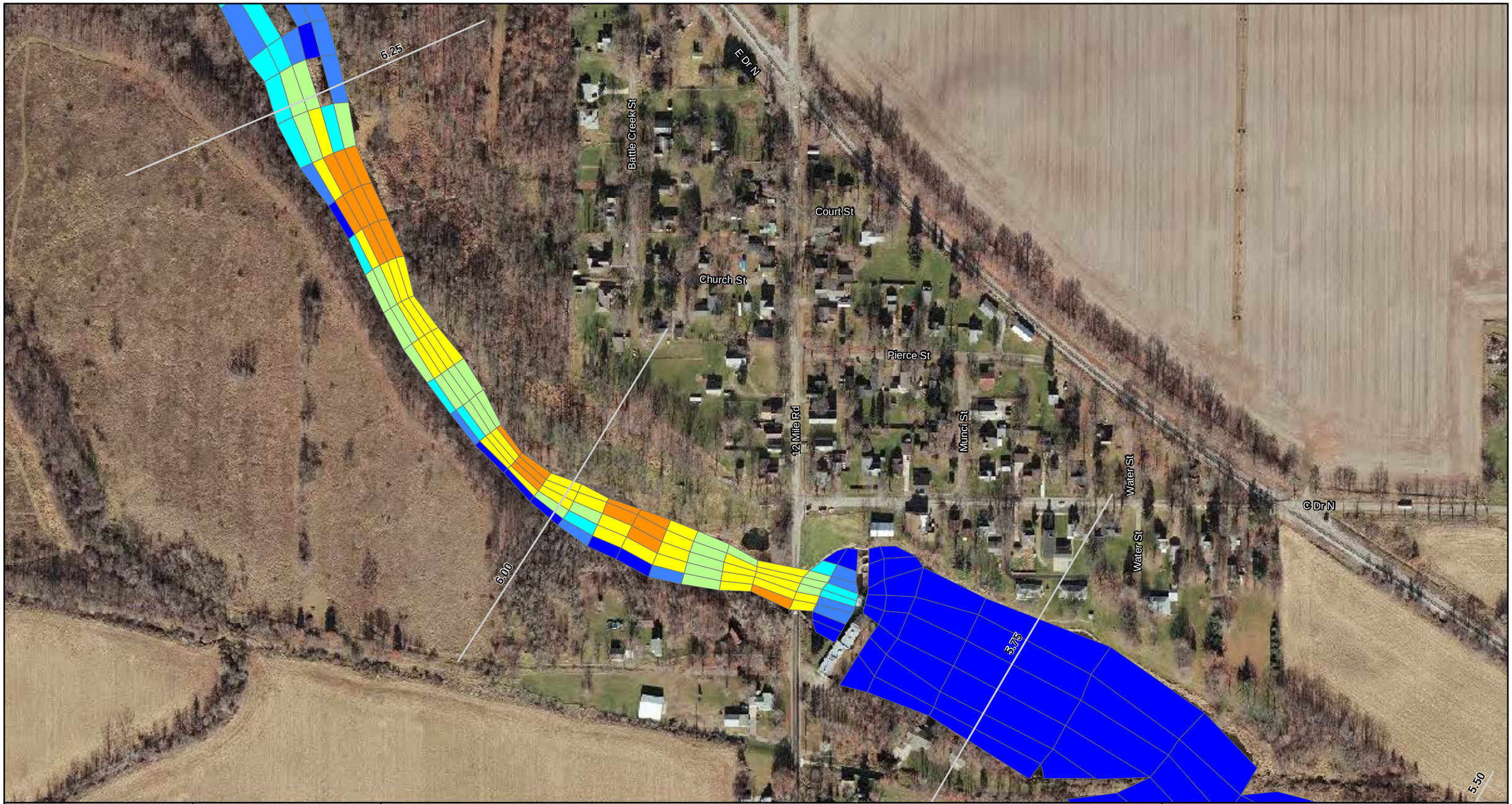
MP 04.90 - MP 05.65

SHEET 5 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

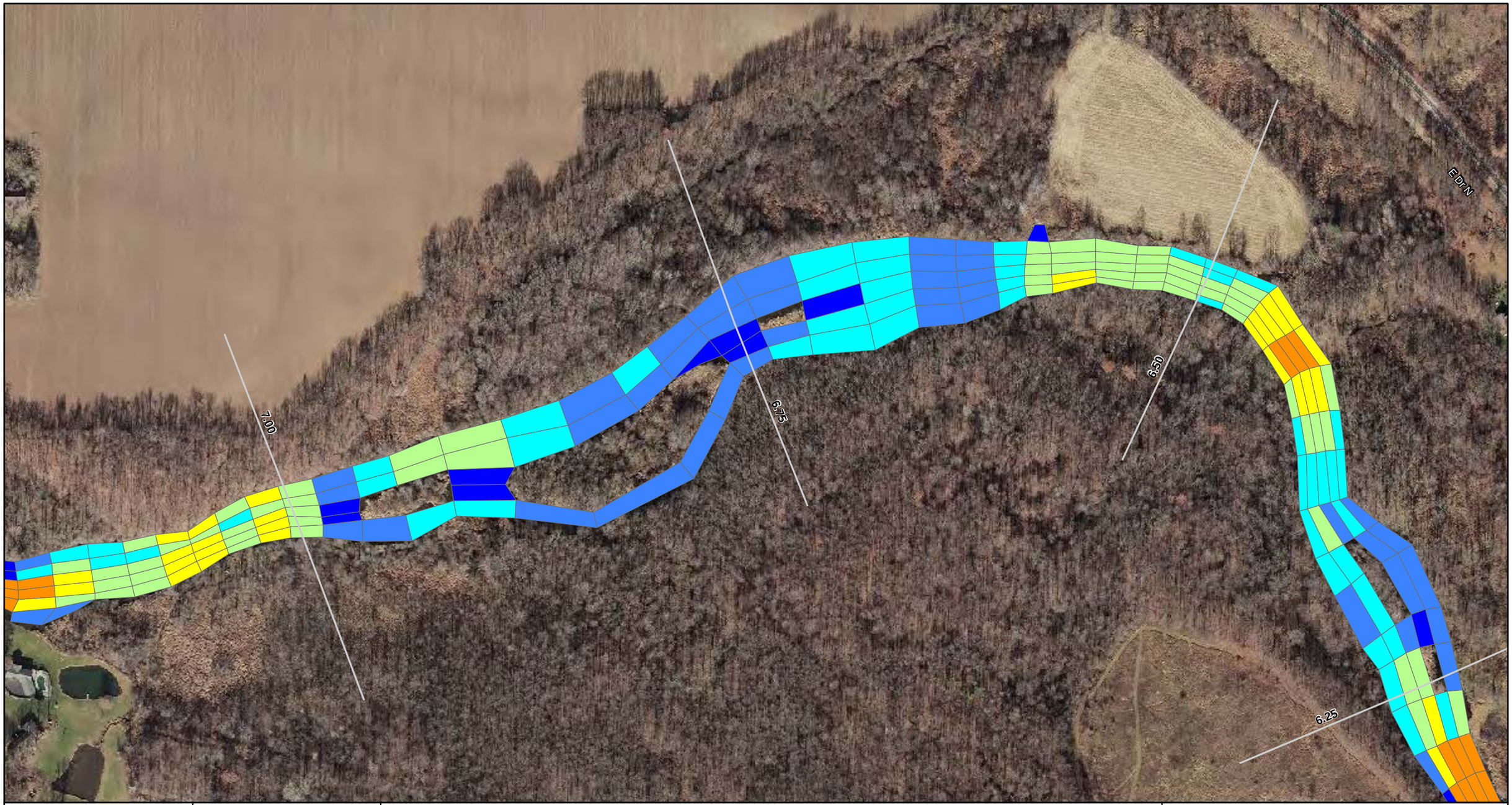
MP 05.65 - MP 06.30

SHEET 6 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

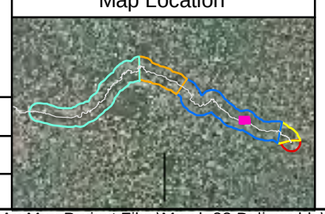
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

MP 06.20 - MP 07.15

SHEET 7 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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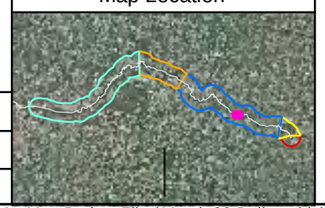
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

MP 07.15 - MP 07.95

SHEET 8 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

8.75

8.50

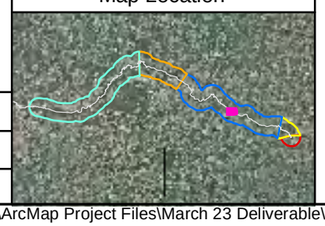
8.25

8.00

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
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- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

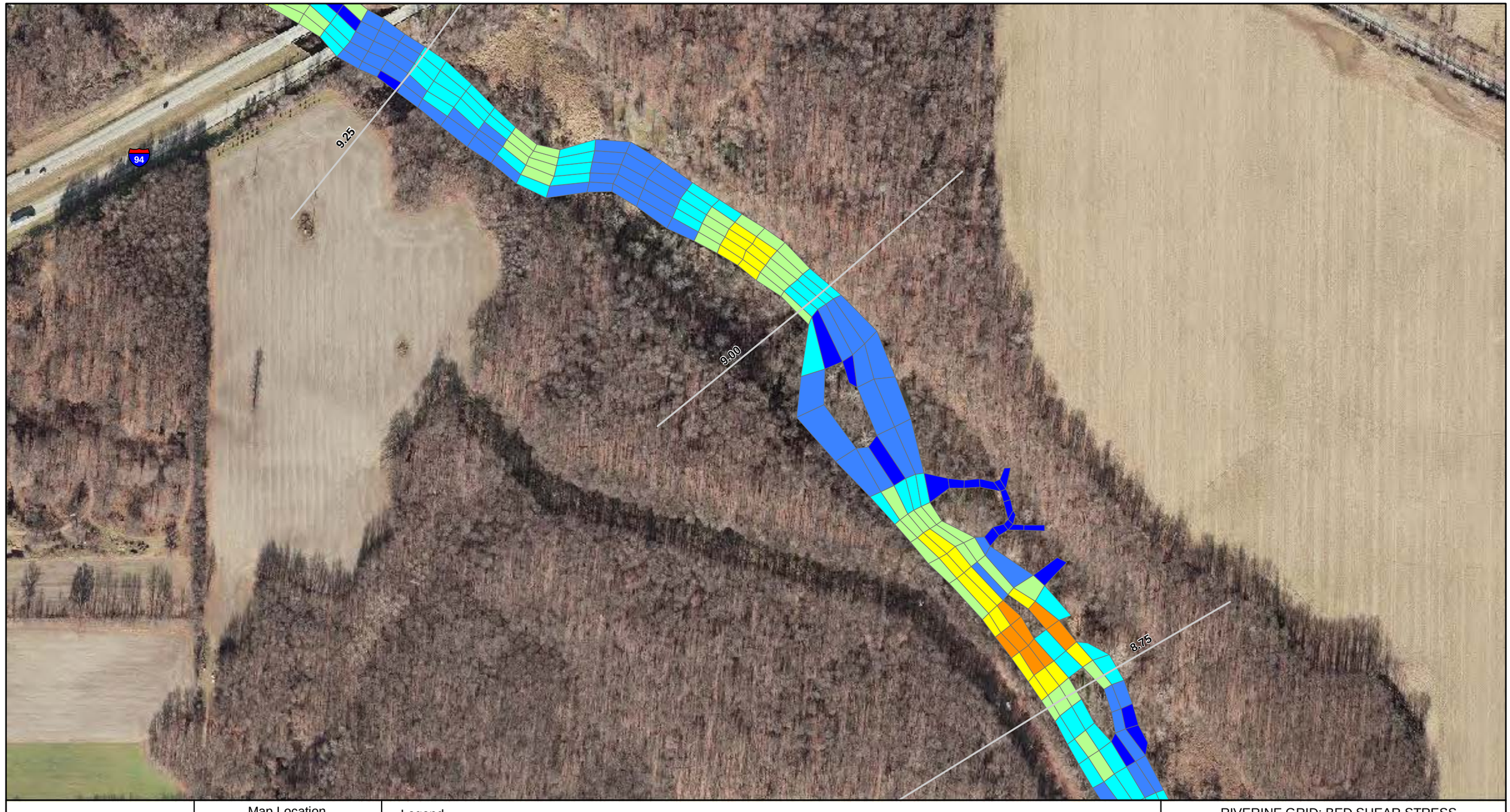
MP 07.90 - MP 08.75

SHEET 9 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

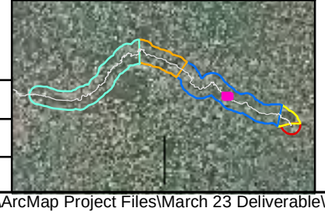
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
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- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

MP 08.70 - MP 09.30

SHEET 10 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
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- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

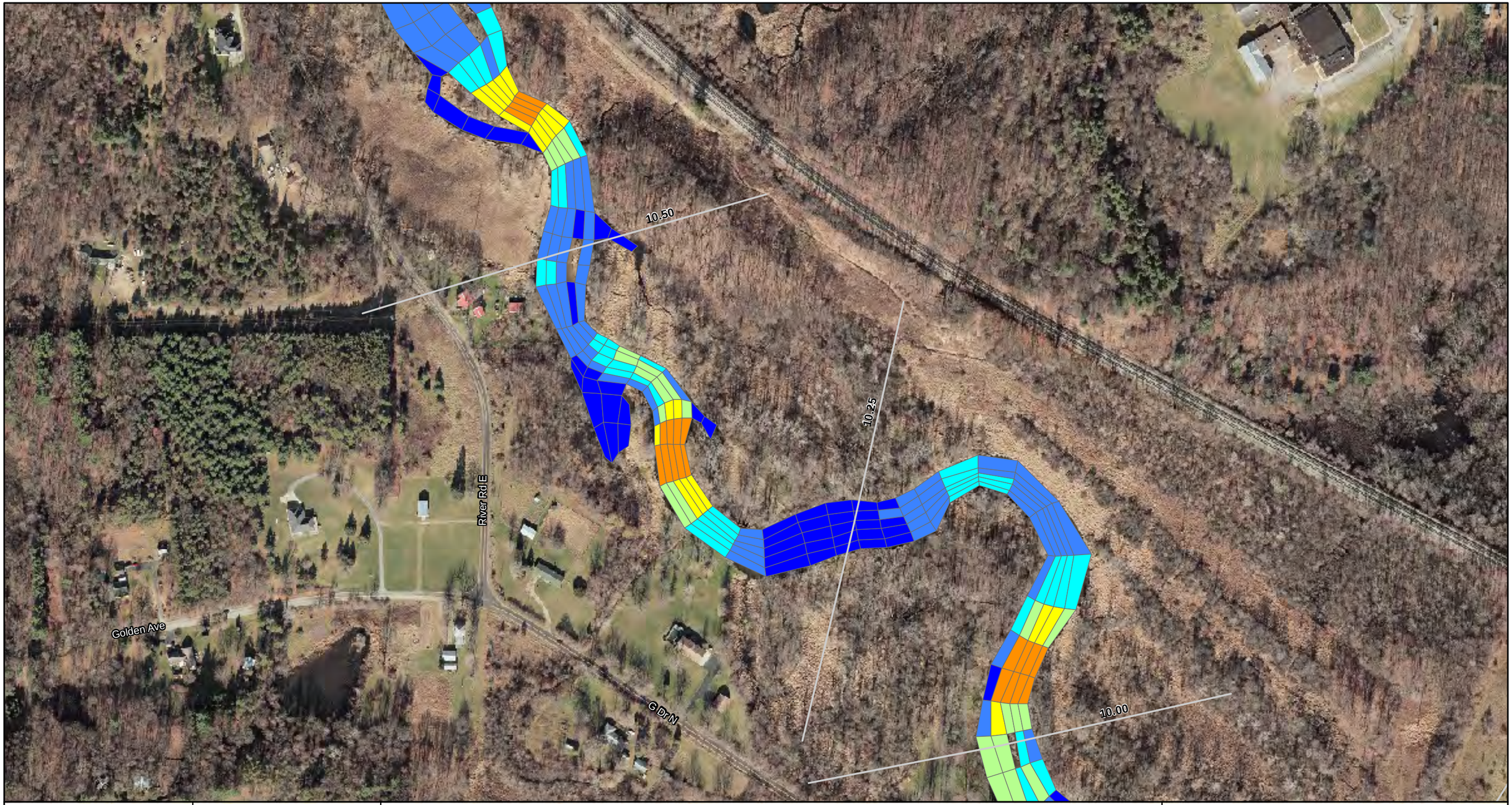
MP 09.25 - MP 10.05

SHEET 11 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

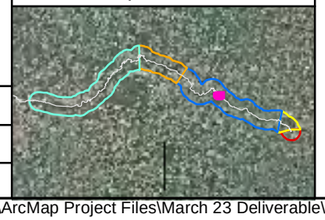
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

Aerial Photography Date: November 2011



Drawn:	BRS 3/22/2012
Approved:	DBR 3/22/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

MP 10.00 - MP 10.65

SHEET 12 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

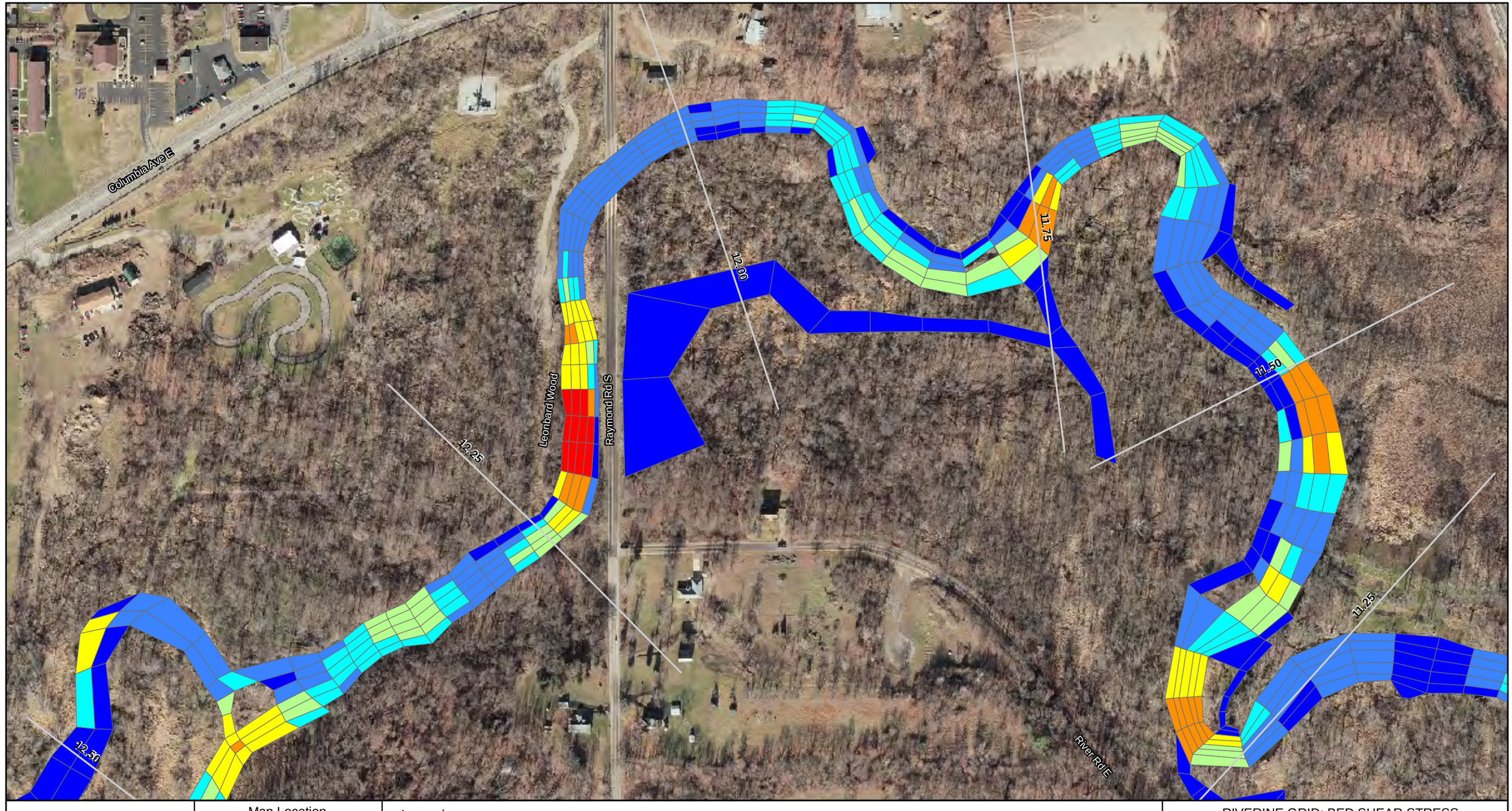
MP 10.60 - MP 11.40

SHEET 13 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

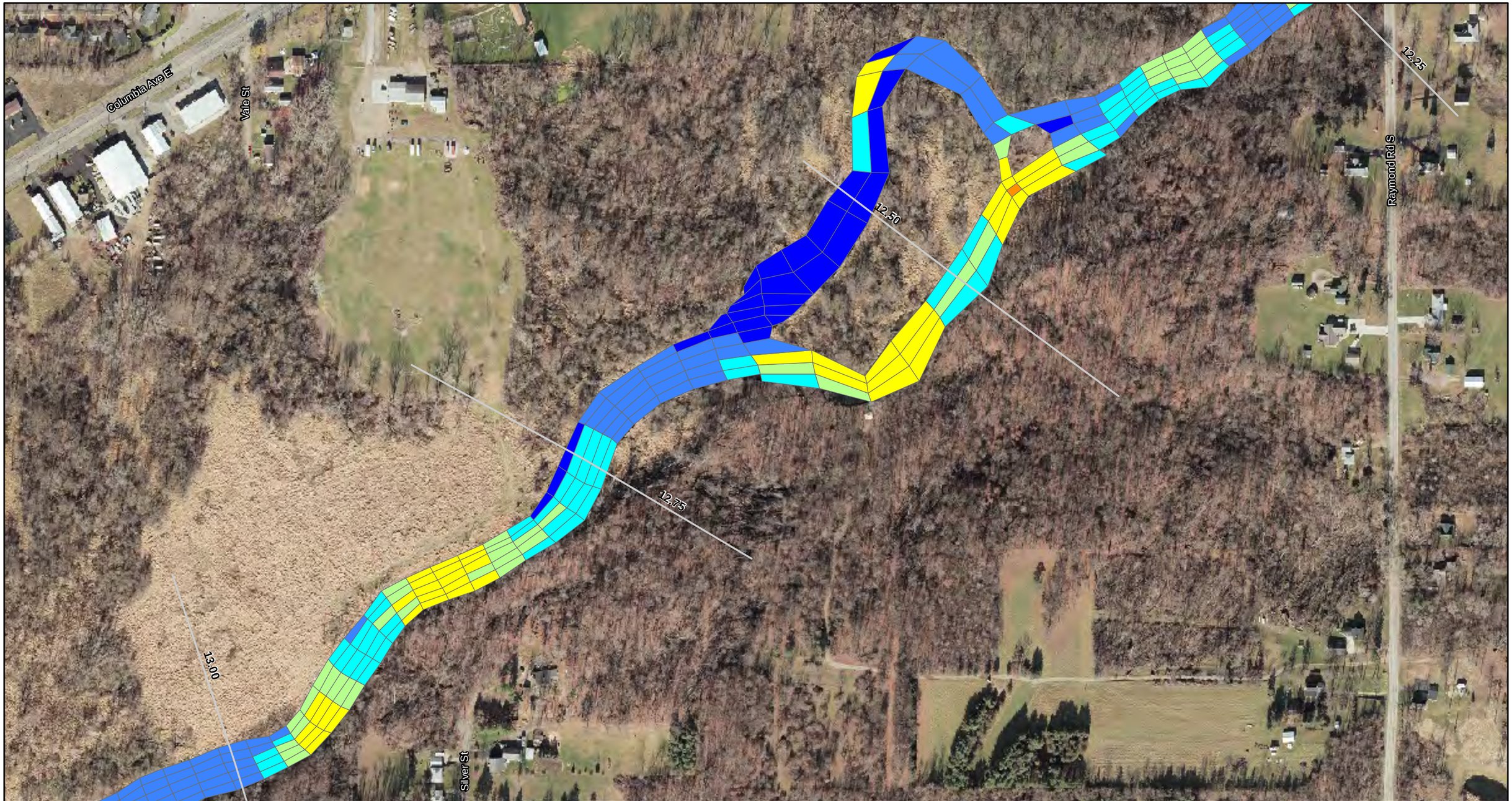
MP 11.10 - MP 12.45

SHEET 14 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

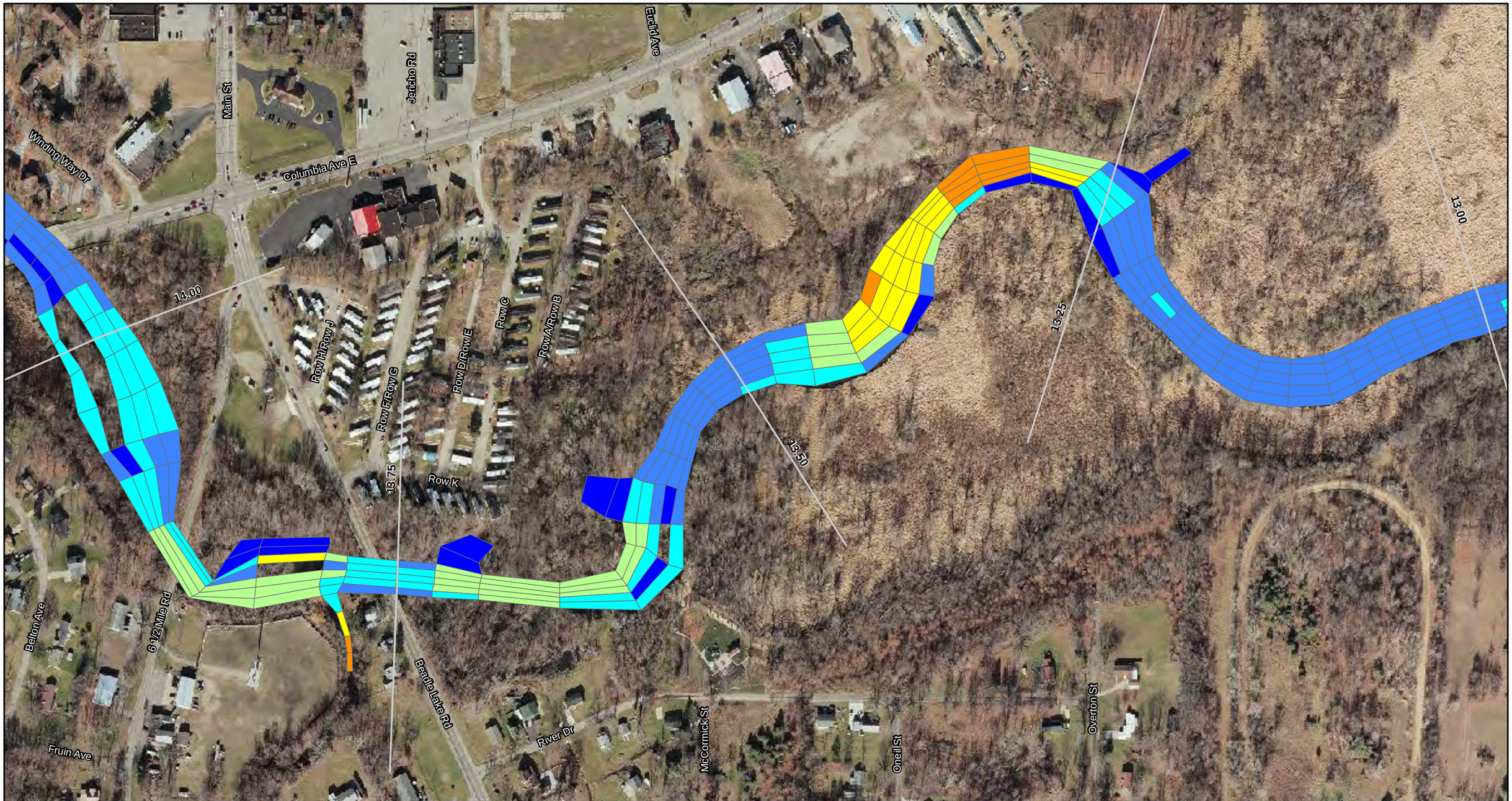
MP 12.30 - MP 13.05

SHEET 15 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

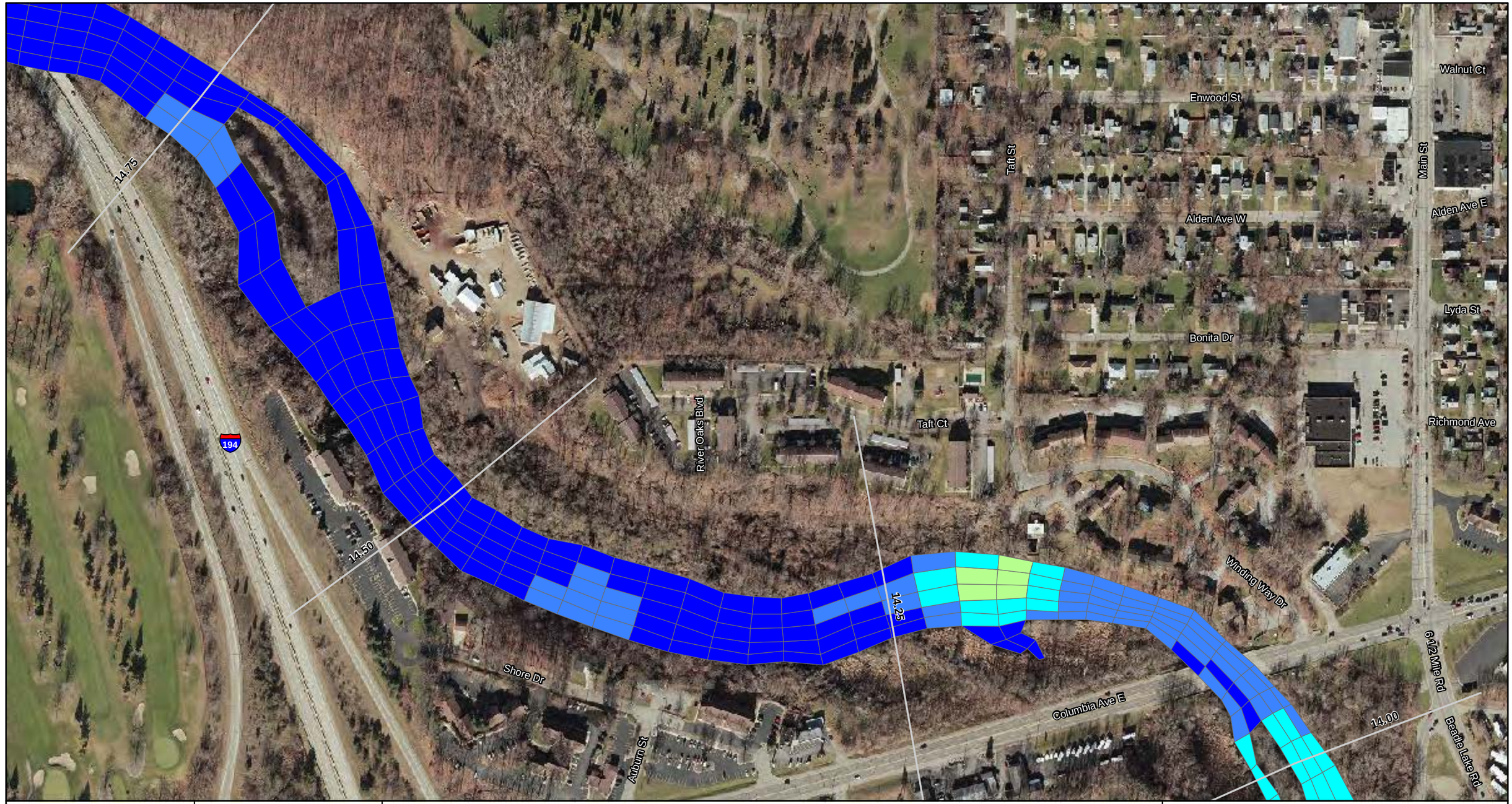
MP 13.00 - MP 14.10

SHEET 16 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

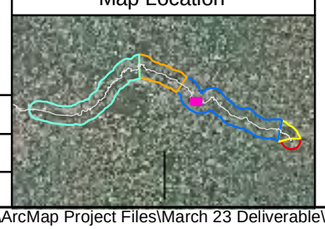
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

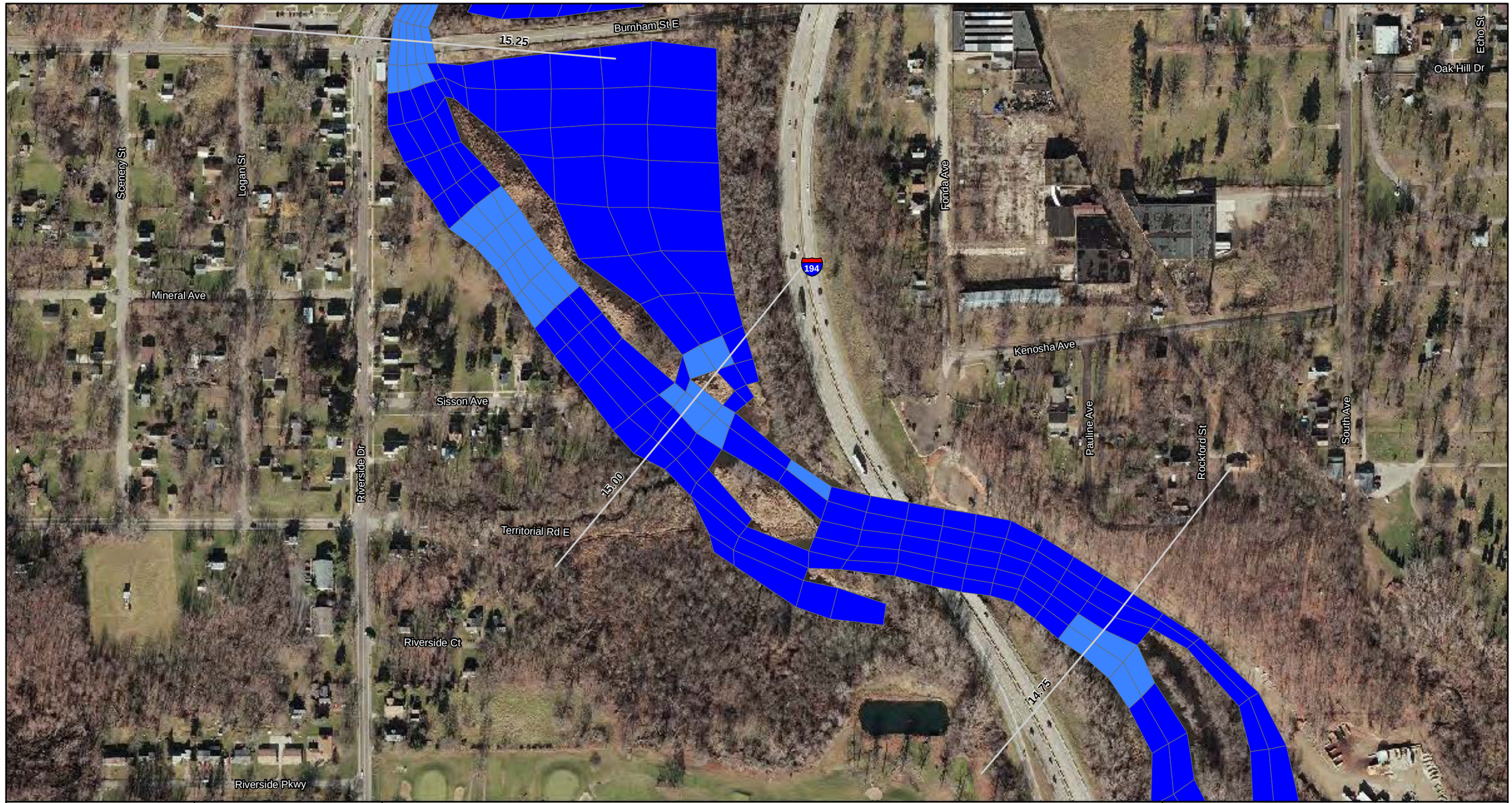
MP 14.00 - MP 14.85

SHEET 17 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

Aerial Photography Date: November 2011



Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

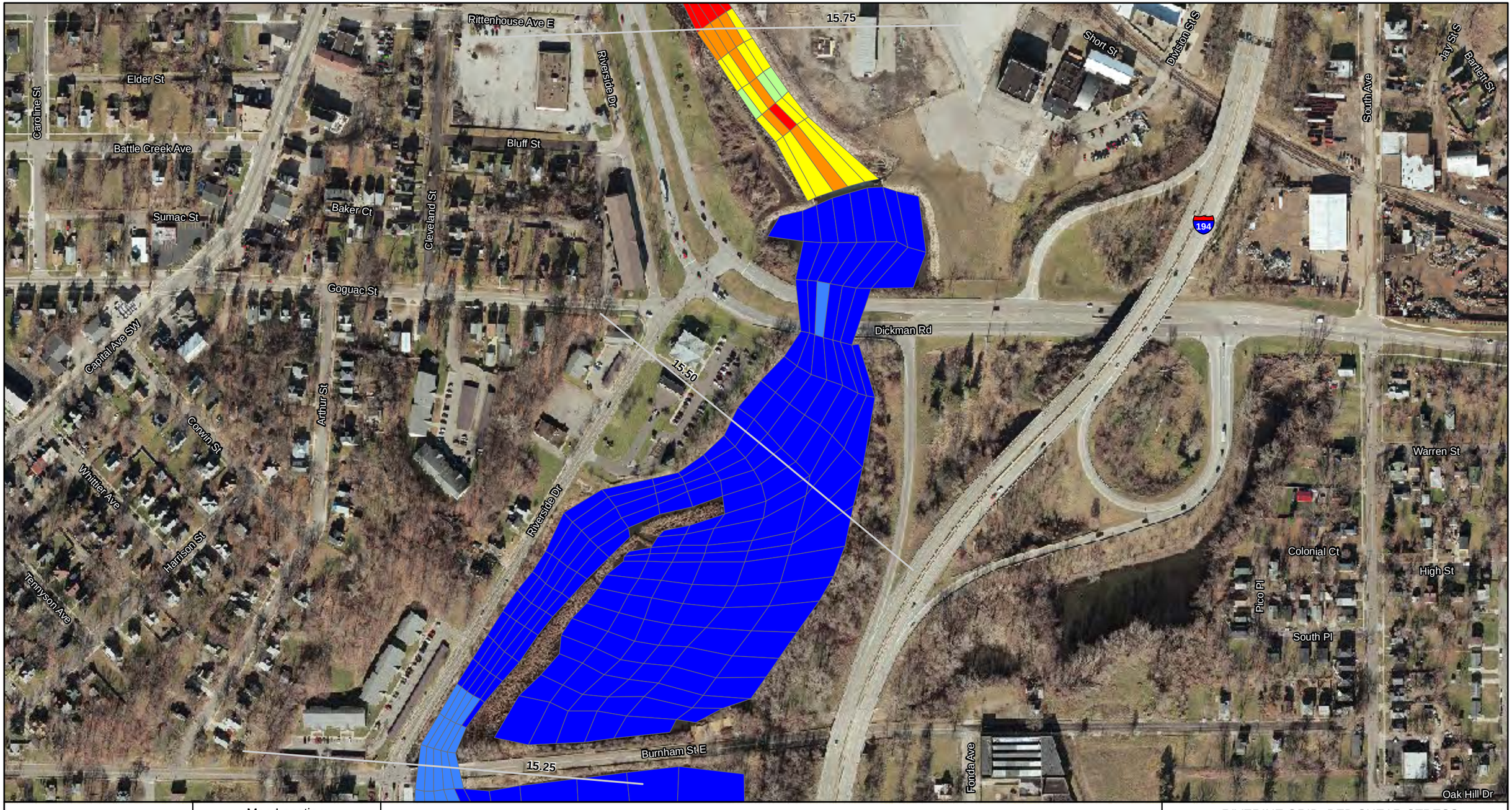
MP 14.65 - MP 15.25

SHEET 18 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

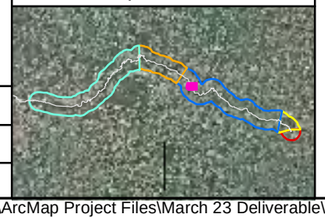
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

MP 15.25 - MP 15.75

SHEET 19 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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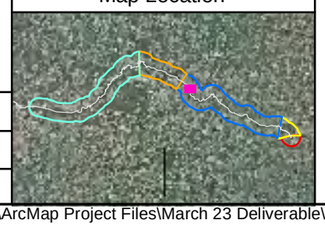
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

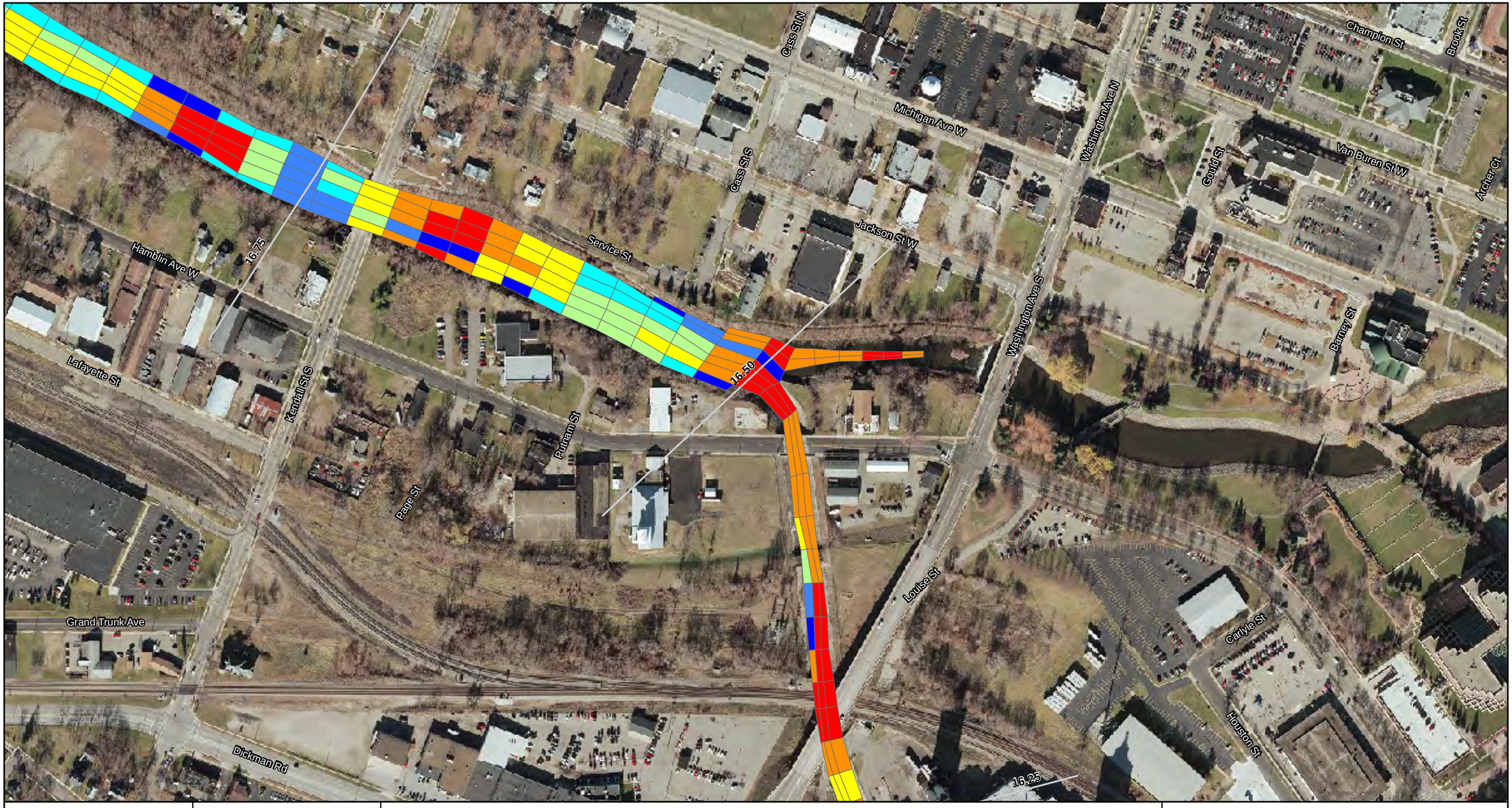
MP 15.75 - MP 16.30

SHEET 20 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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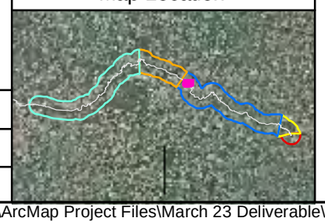
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

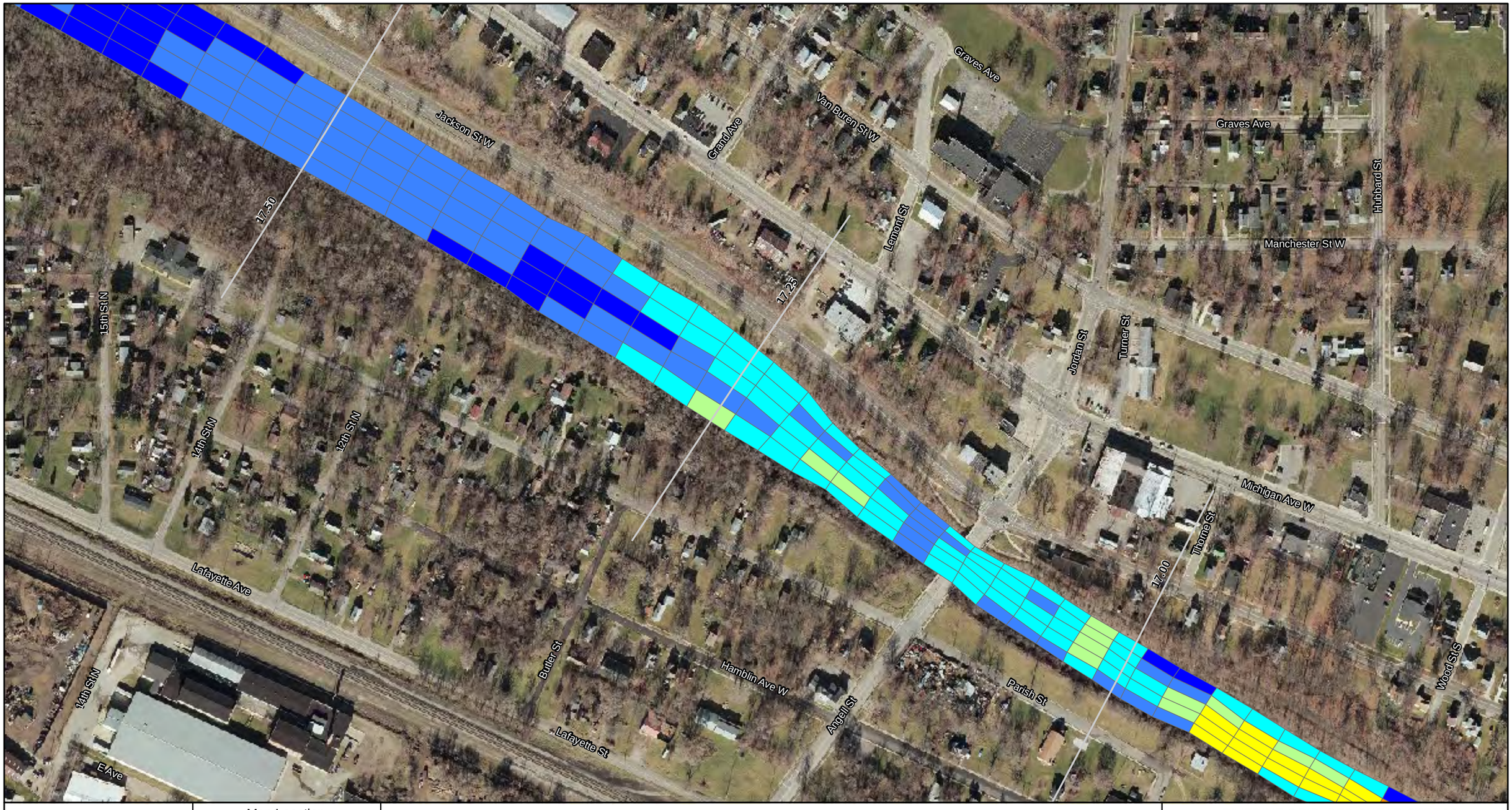
MP 16.30 - MP 16.95

SHEET 21 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

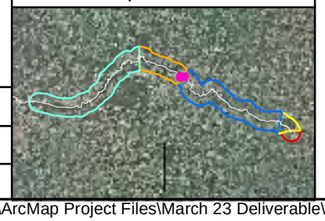
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

MP 16.85 - MP 17.60

SHEET 22 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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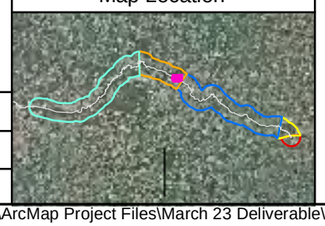
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

MP 17.60 - MP 18.40

SHEET 23 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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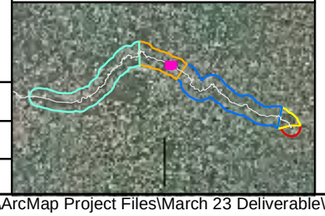
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
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Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

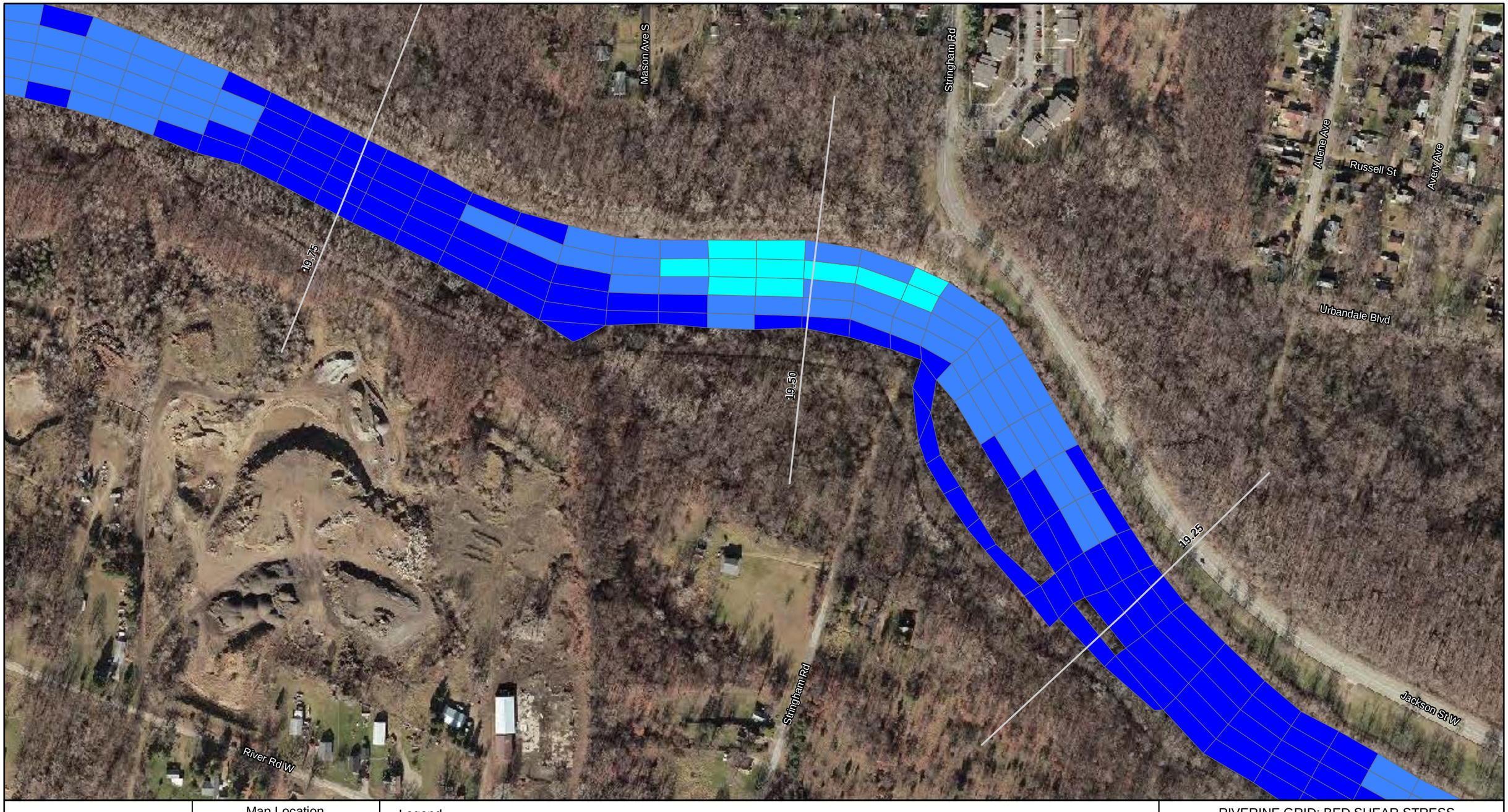
MP 18.30 - MP 19.15

SHEET 24 OF 56

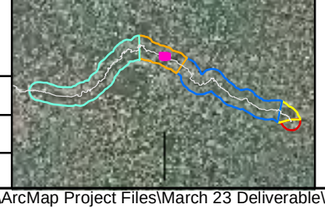
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

Aerial Photography Date: November 2011



Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
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Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

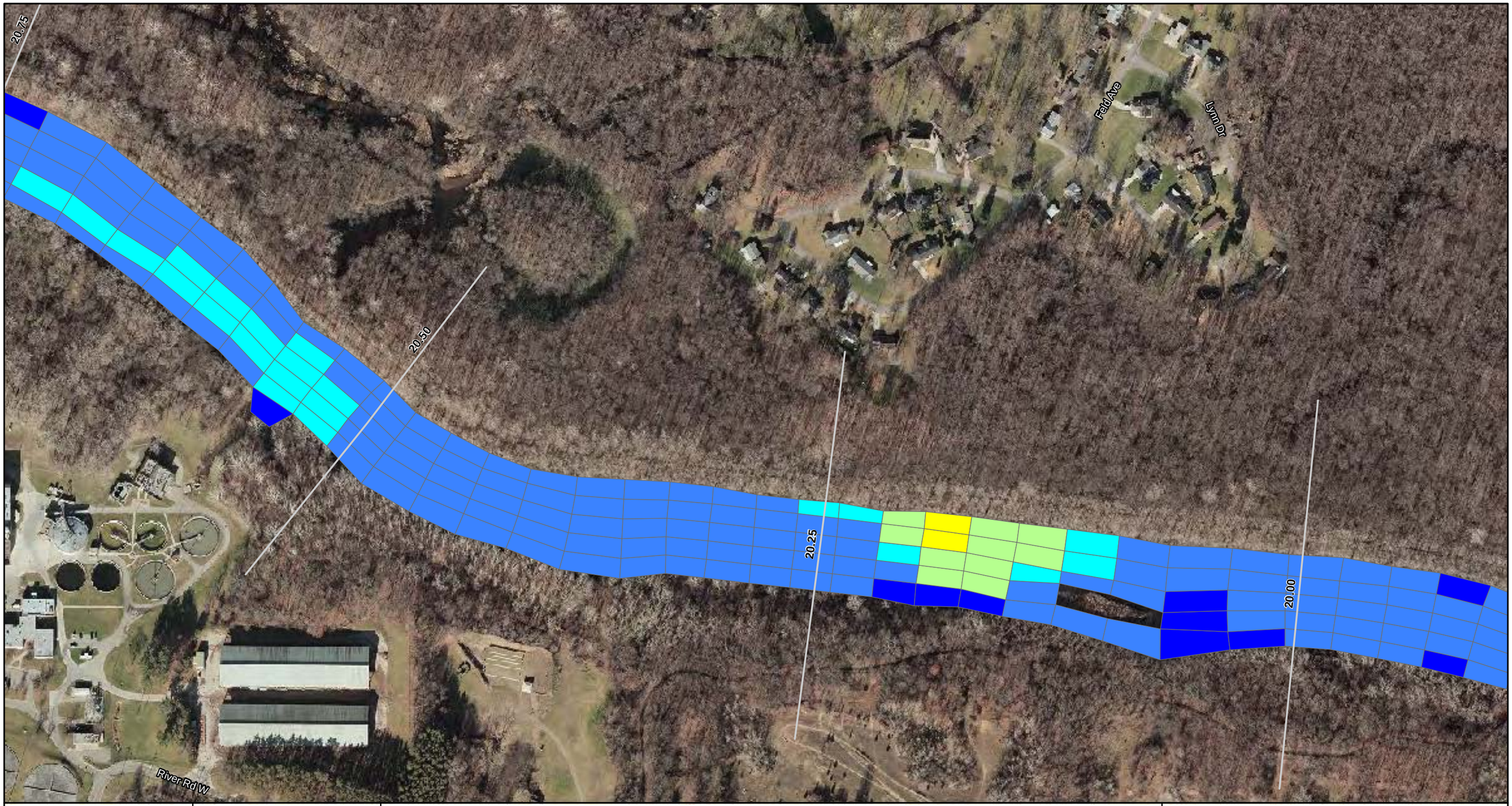
MP 19.10 - MP 19.95

SHEET 25 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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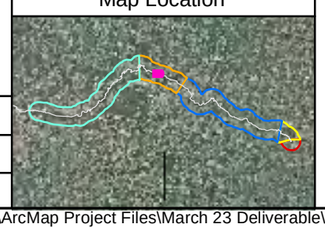
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
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Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

N

0 125 250 500
Scale in Feet

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

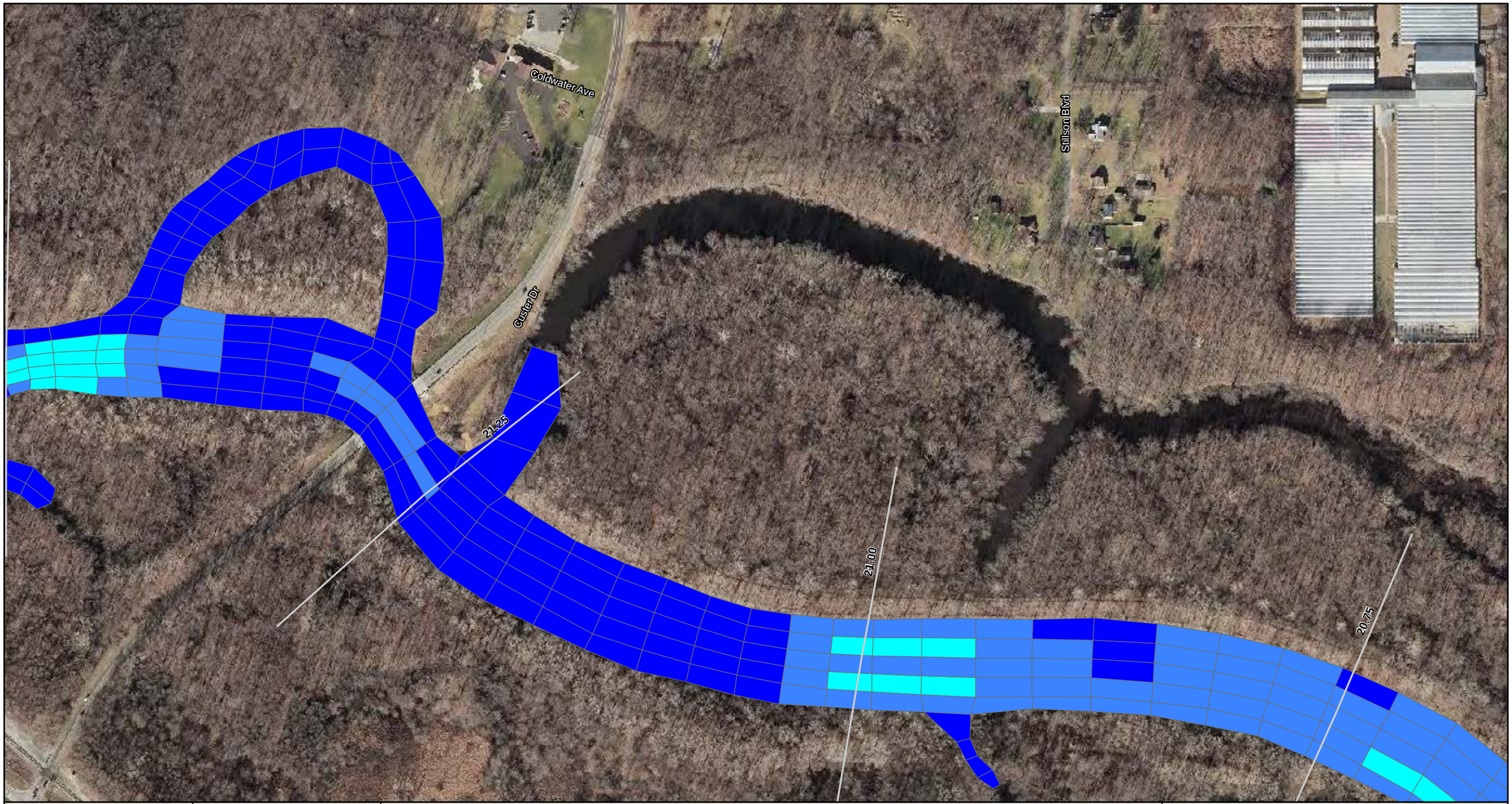
MP 19.90 - MP 20.75

SHEET 26 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
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Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

MP 20.70 - MP 21.50

SHEET 27 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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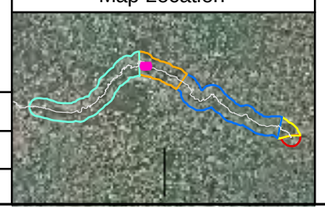
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

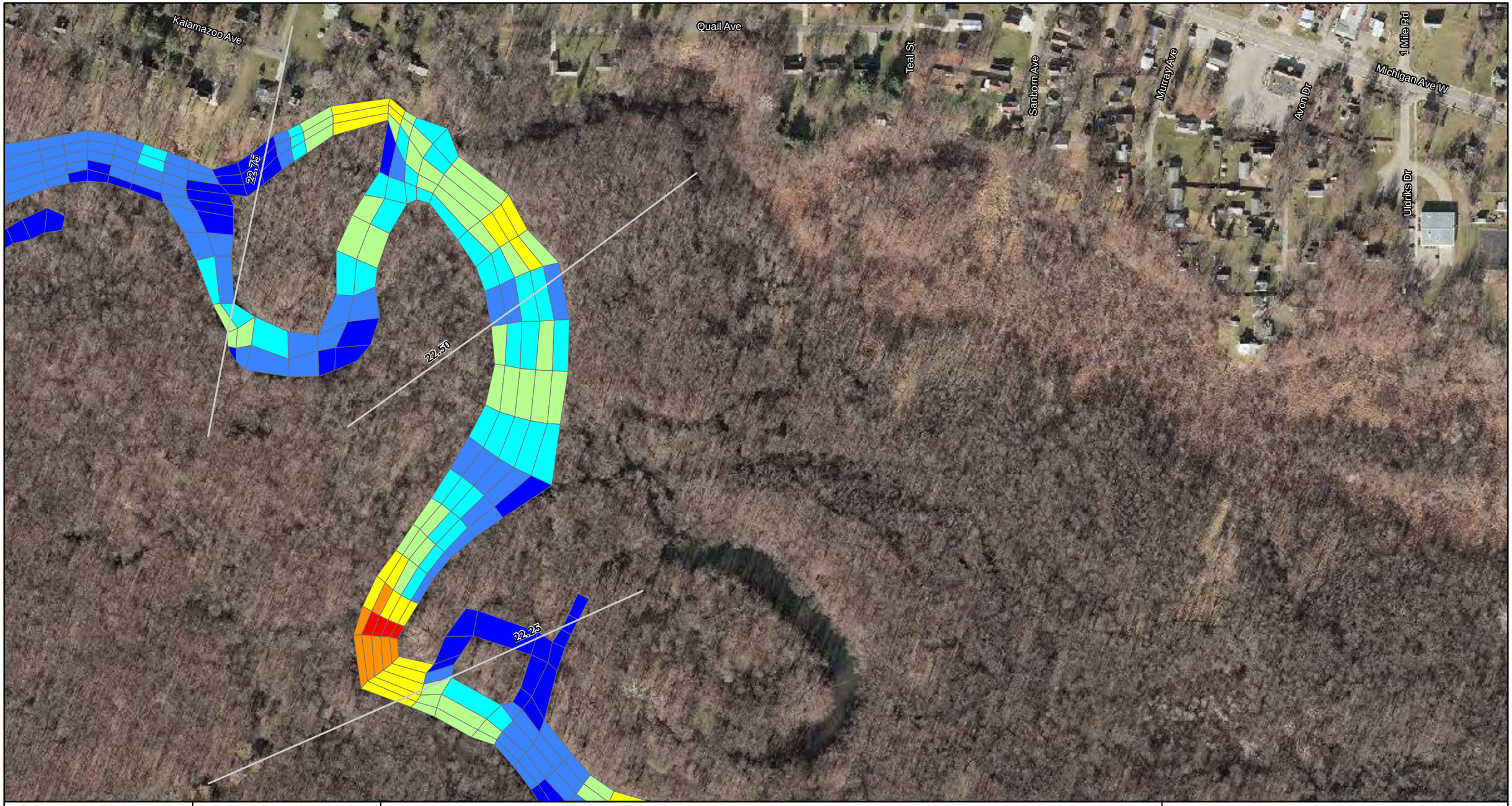
MP 21.35 - MP 22.15

SHEET 28 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

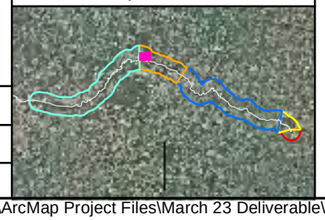
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

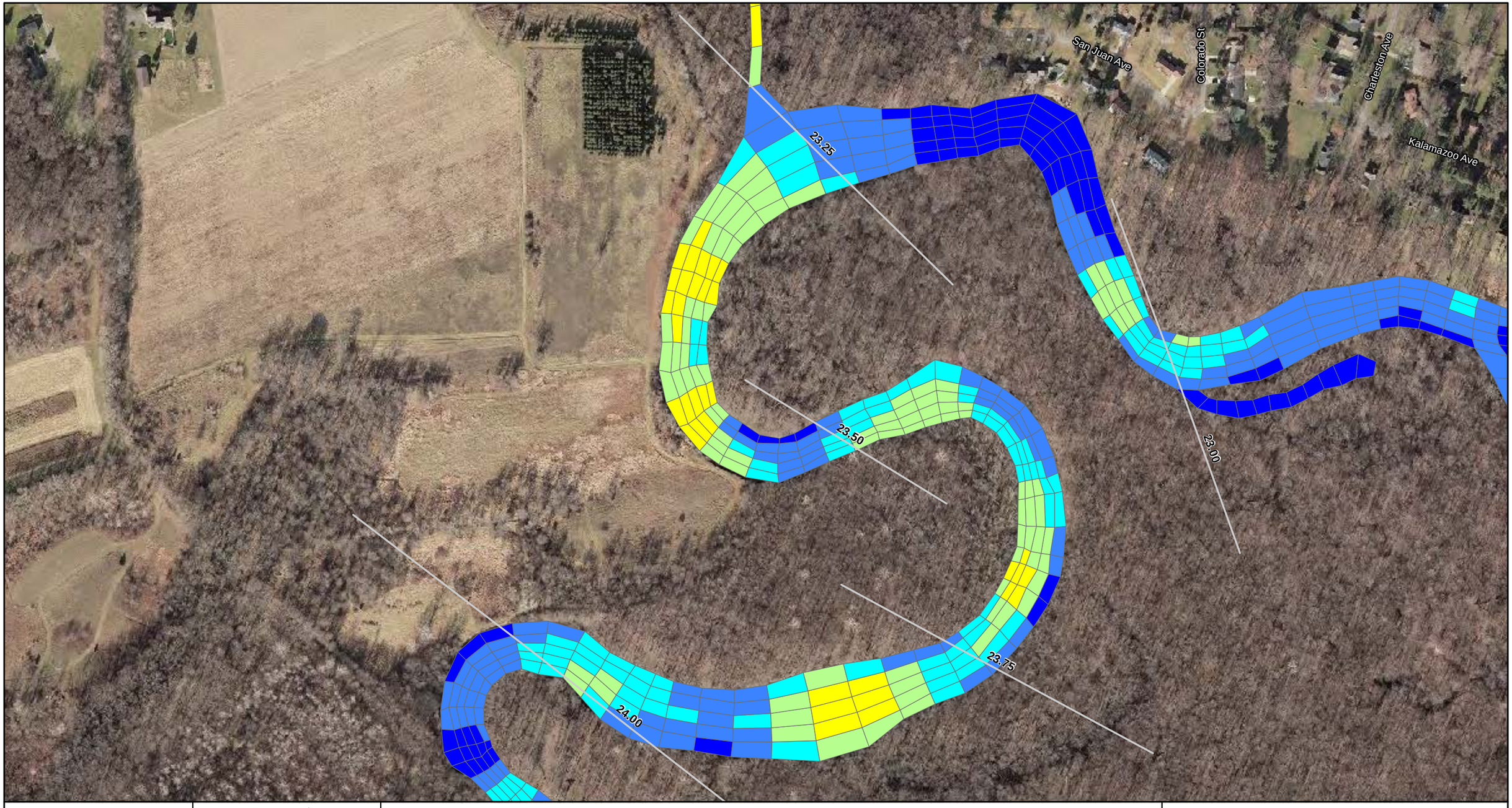
MP 22.15 - MP 22.90

SHEET 29 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

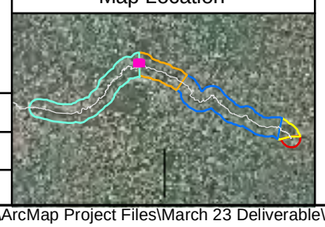
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

MP 22.80 - MP 24.10

SHEET 30 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

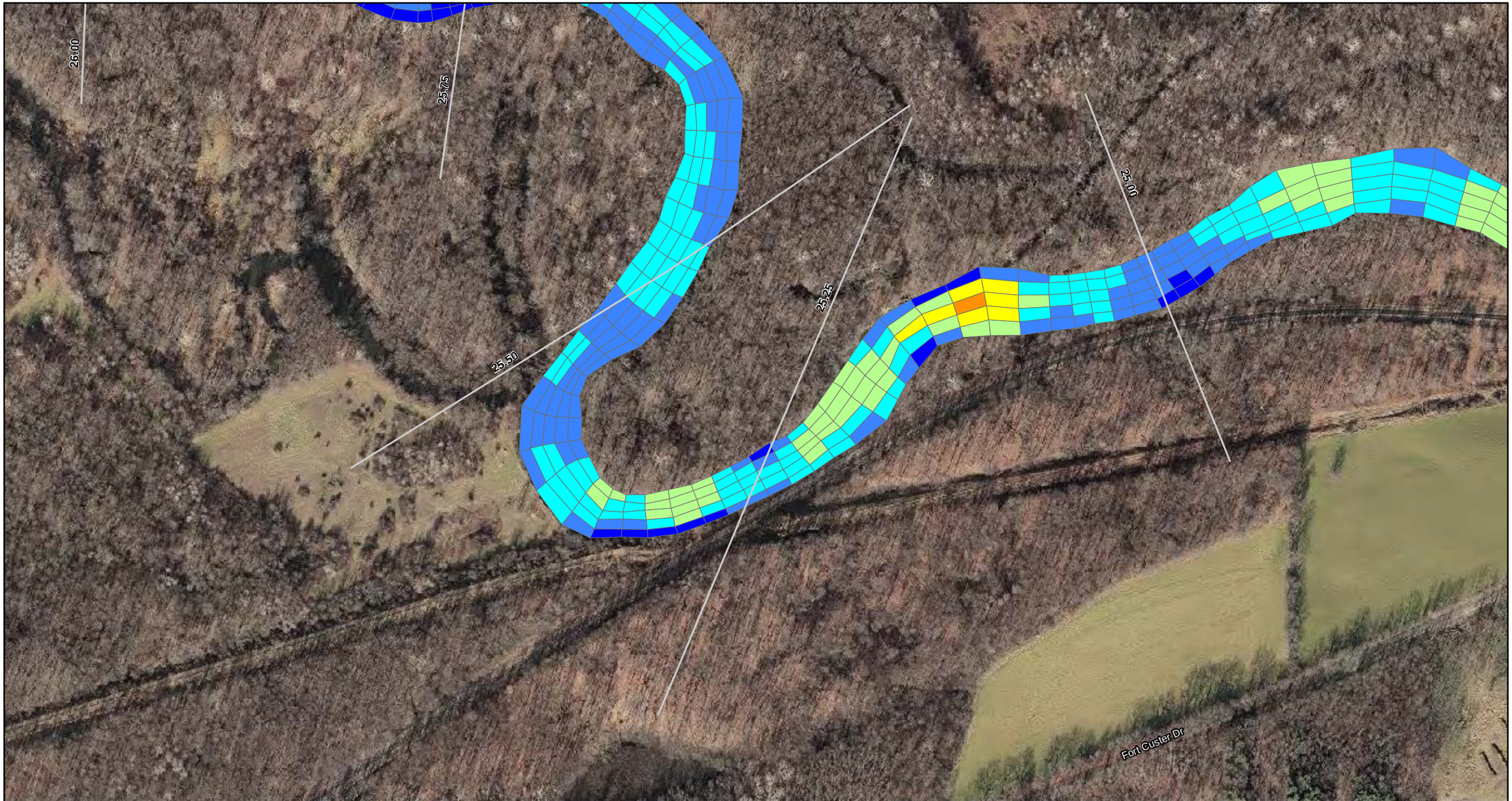
MP 24.10 - MP 24.85

SHEET 31 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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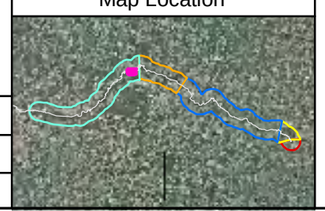
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

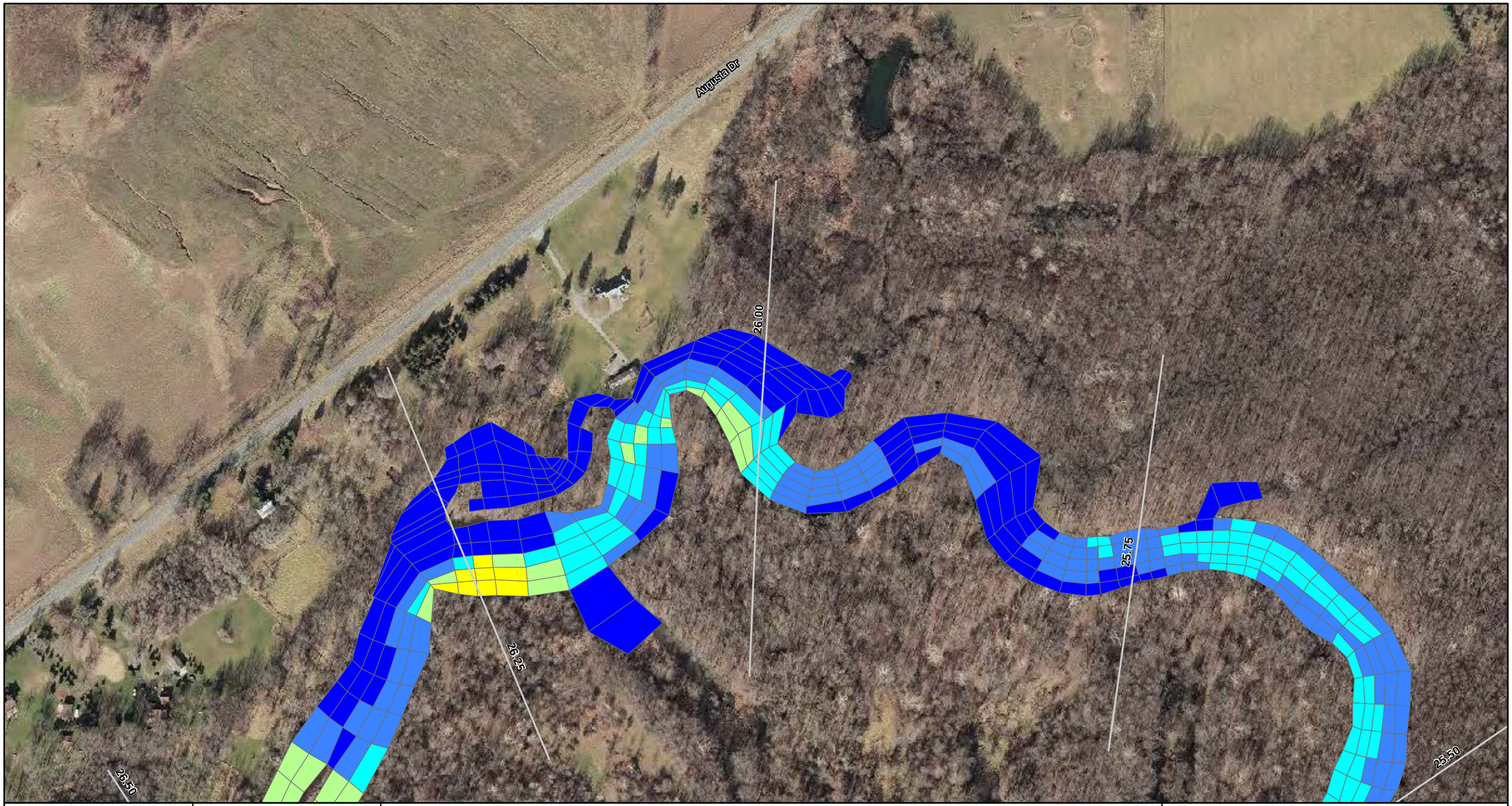
MP 24.80 - MP 25.65

SHEET 32 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

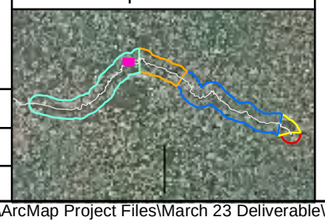
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

Aerial Photography Date: November 2011



Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

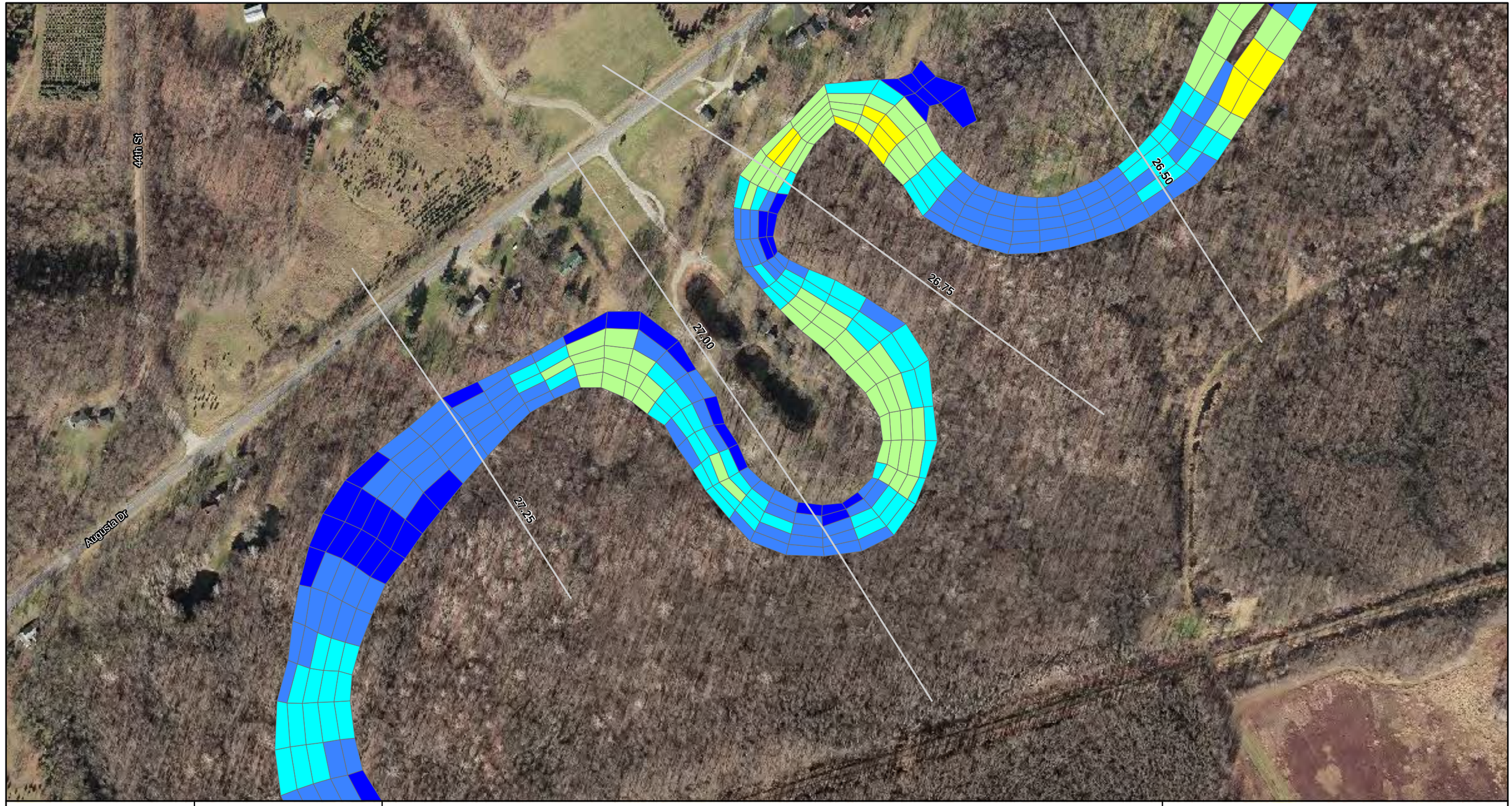
MP 25.55 - MP 26.40

SHEET 33 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

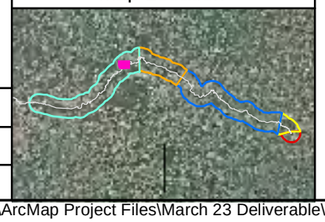
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

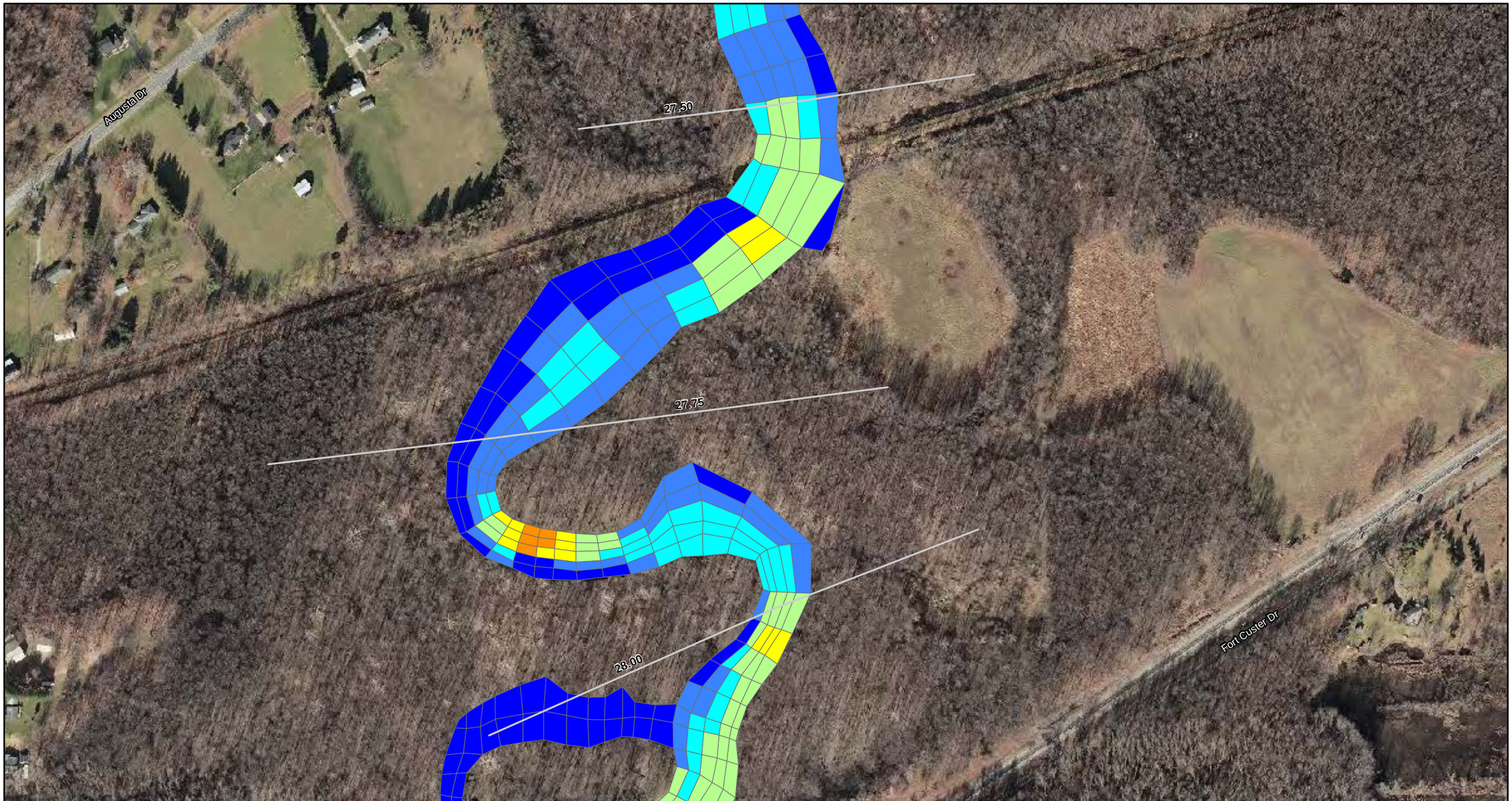
MP 26.40 - MP 27.45

SHEET 34 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

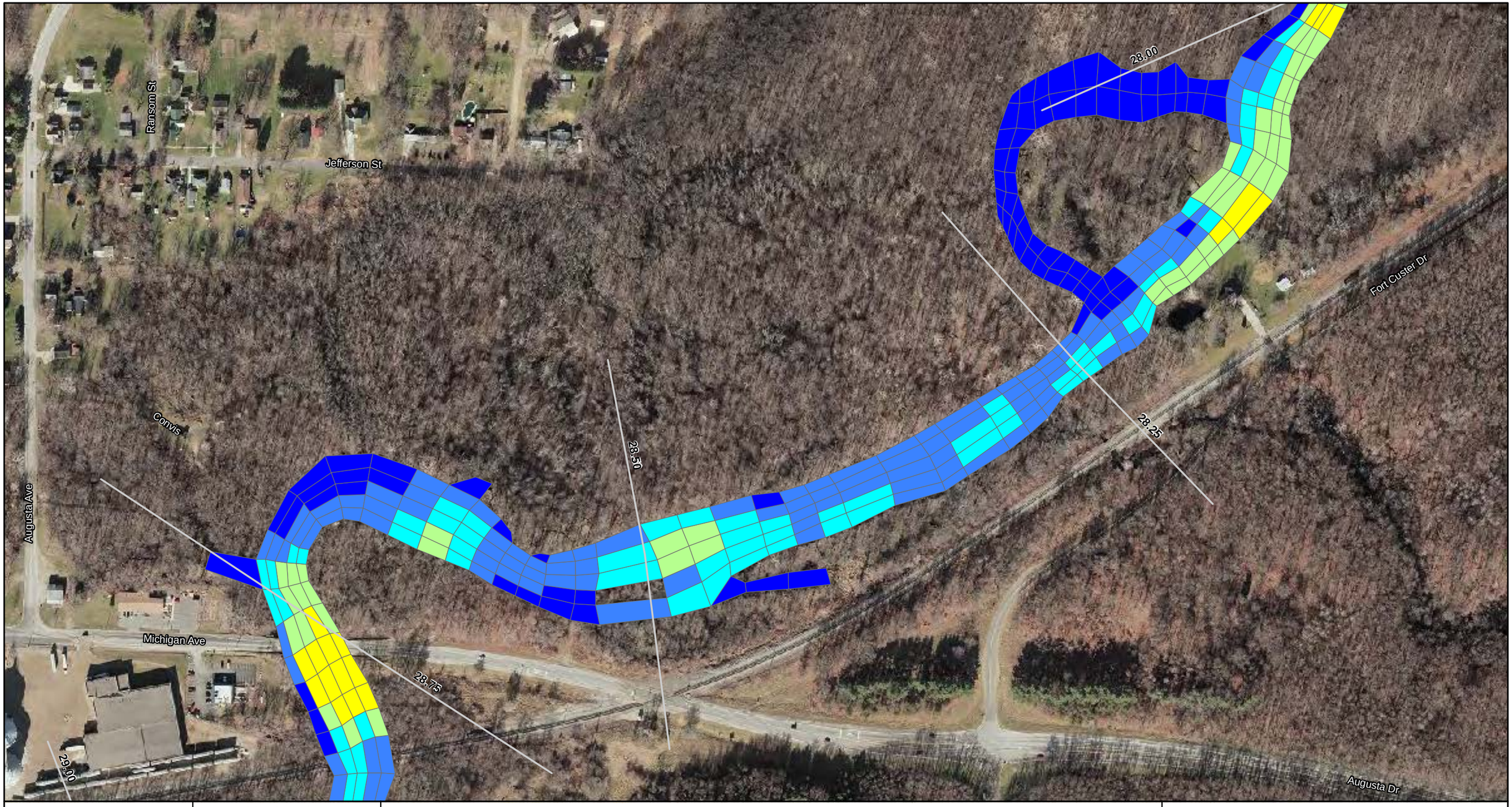
MP 27.45 - MP 28.10

SHEET 35 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

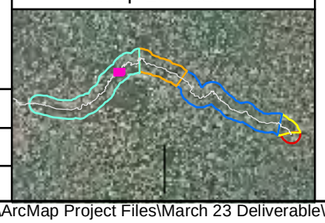
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

MP 28.05 - MP 28.85

SHEET 36 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

Clinton St
Clinton St
Chestnut St
Webster St
Church St
Fayette St
Cass St
Cherry St
Lincoln St
28.75
29.00
29.25
29.50
Augusta Climax Rd
Fort Custer Rec Area Access

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

MP 28.85 - MP29.55

SHEET 37 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

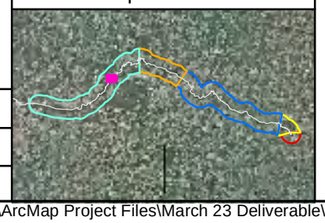
Aerial Photography Date: November 2011

29.50
29.75
30.00
30.25
Fort Custer Rec Area Service
Fort Custer Rec Area Access

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

MP 29.50 - MP29.95

SHEET 38 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

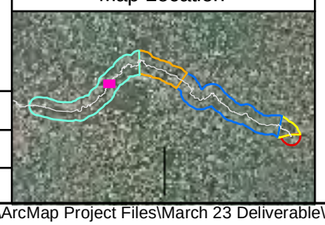
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

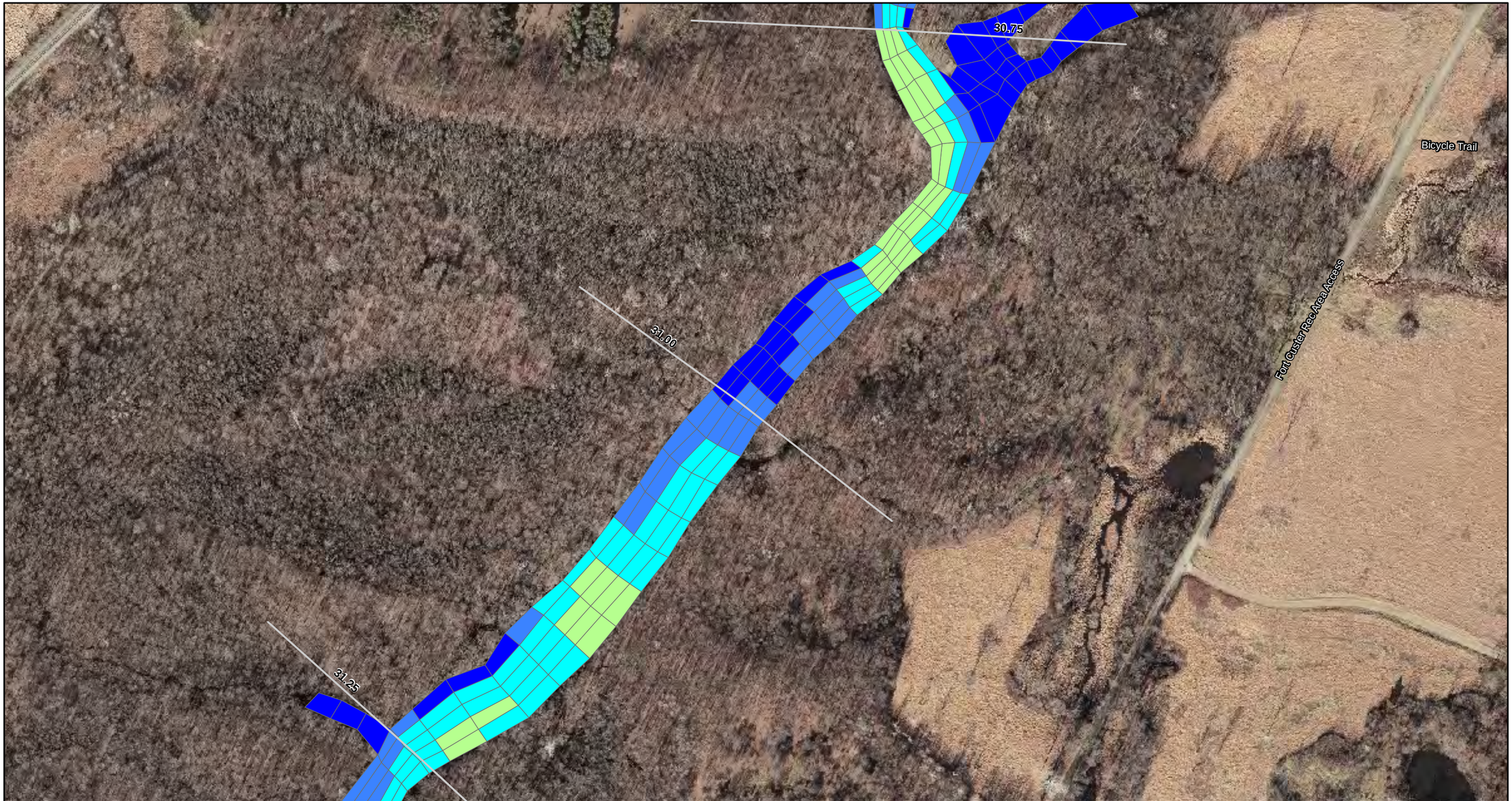
MP 29.95 - MP 30.80

SHEET 39 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

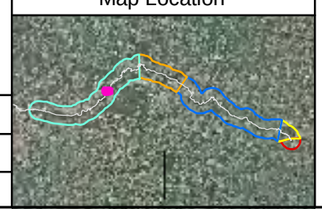
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

MP 30.75 - MP 31.25

SHEET 40 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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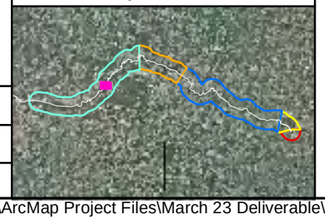
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

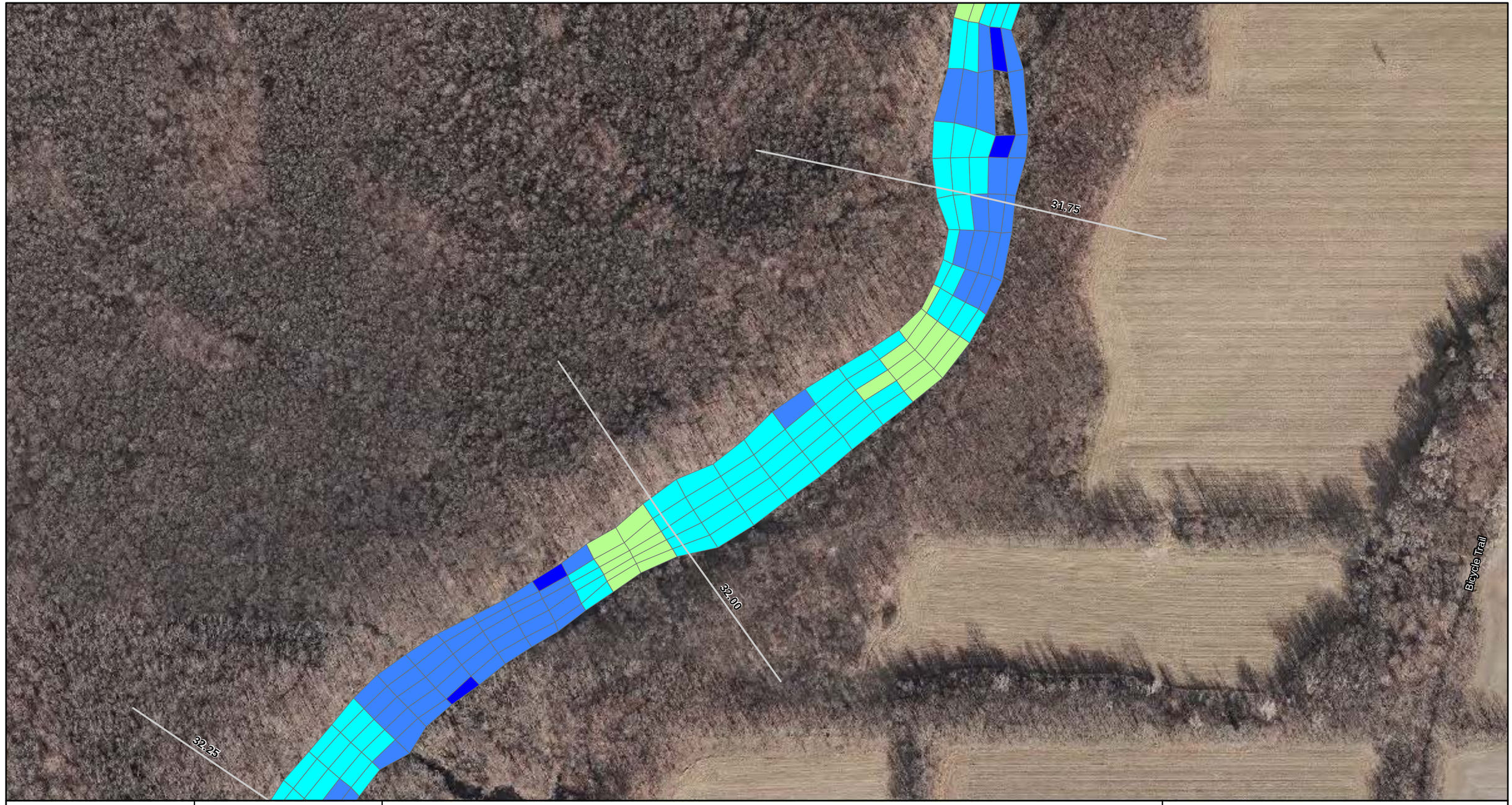
MP 31.25 - MP 31.70

SHEET 41 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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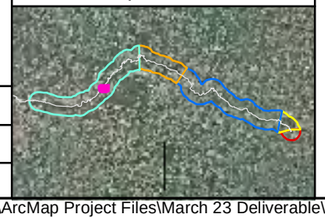
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

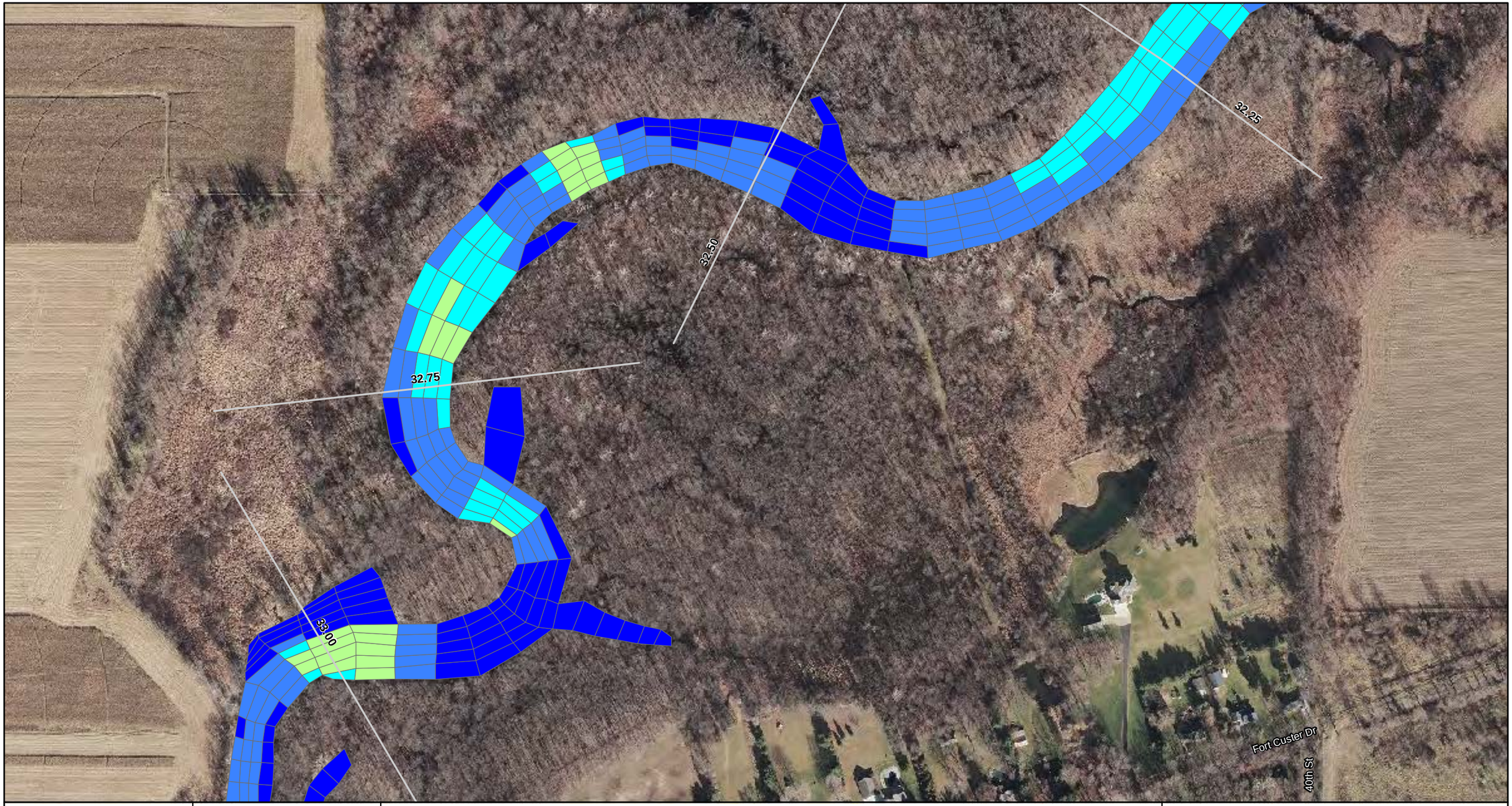
MP 31.65 - MP 32.25

SHEET 42 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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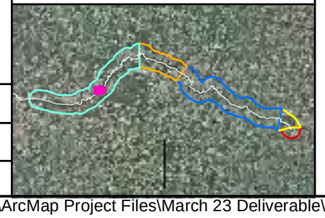
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

MP 32.25 - MP 33.10

SHEET 43 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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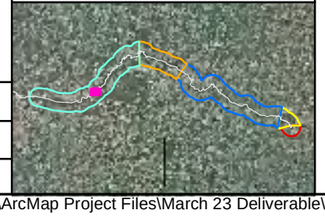
Aerial Photography Date: November 2011

33.00
33.25
33.50
33.75
Fort Custer Dr

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

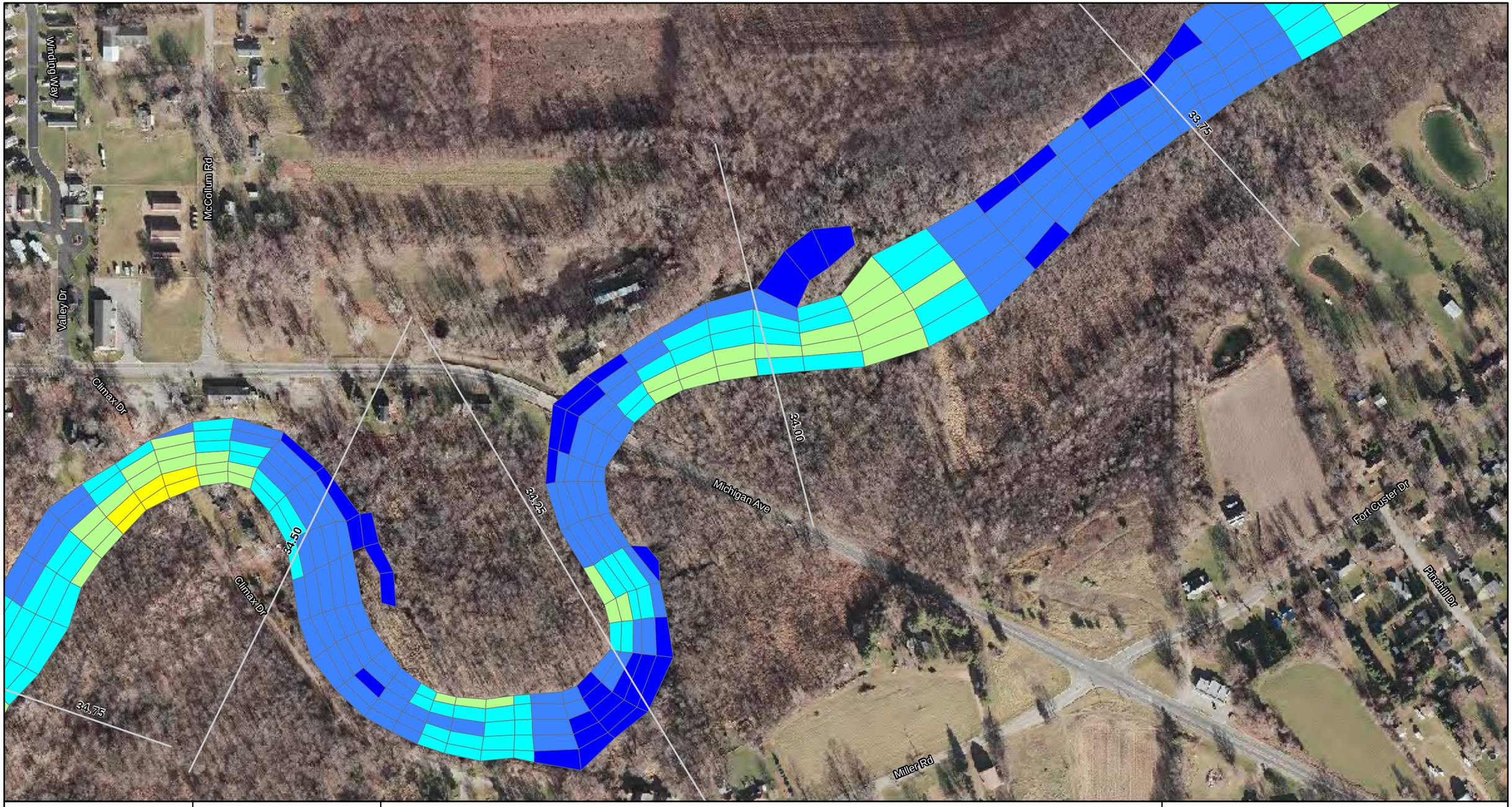
MP 33.10 - MP 33.70

SHEET 44 OF 56

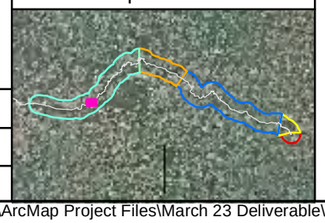
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

Aerial Photography Date: November 2011



Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

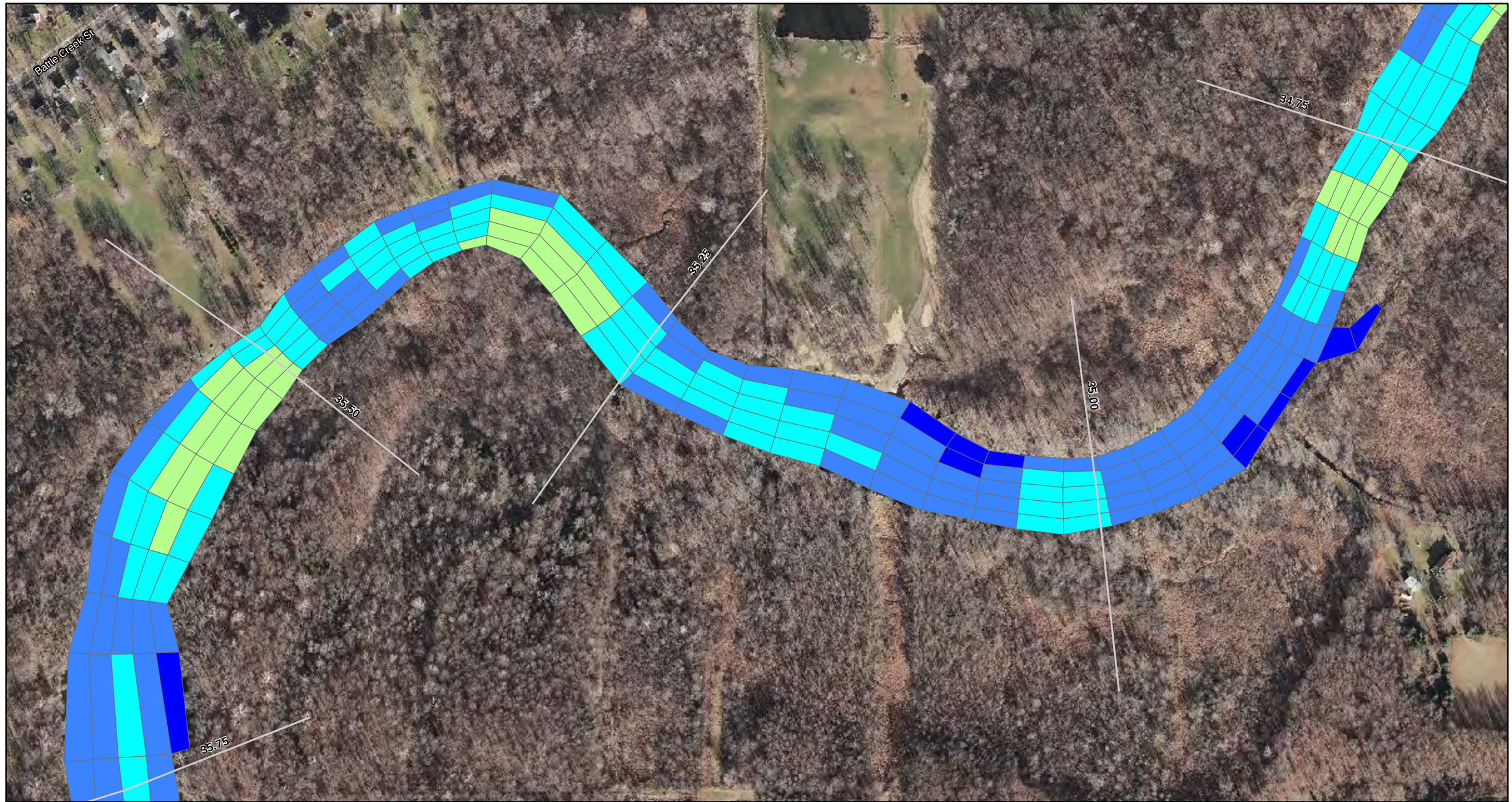
MP 33.70 - MP 34.70

SHEET 45 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

Aerial Photography Date: November 2011



Drawn:	BRS 3/22/2012
Approved:	DBR 3/22/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

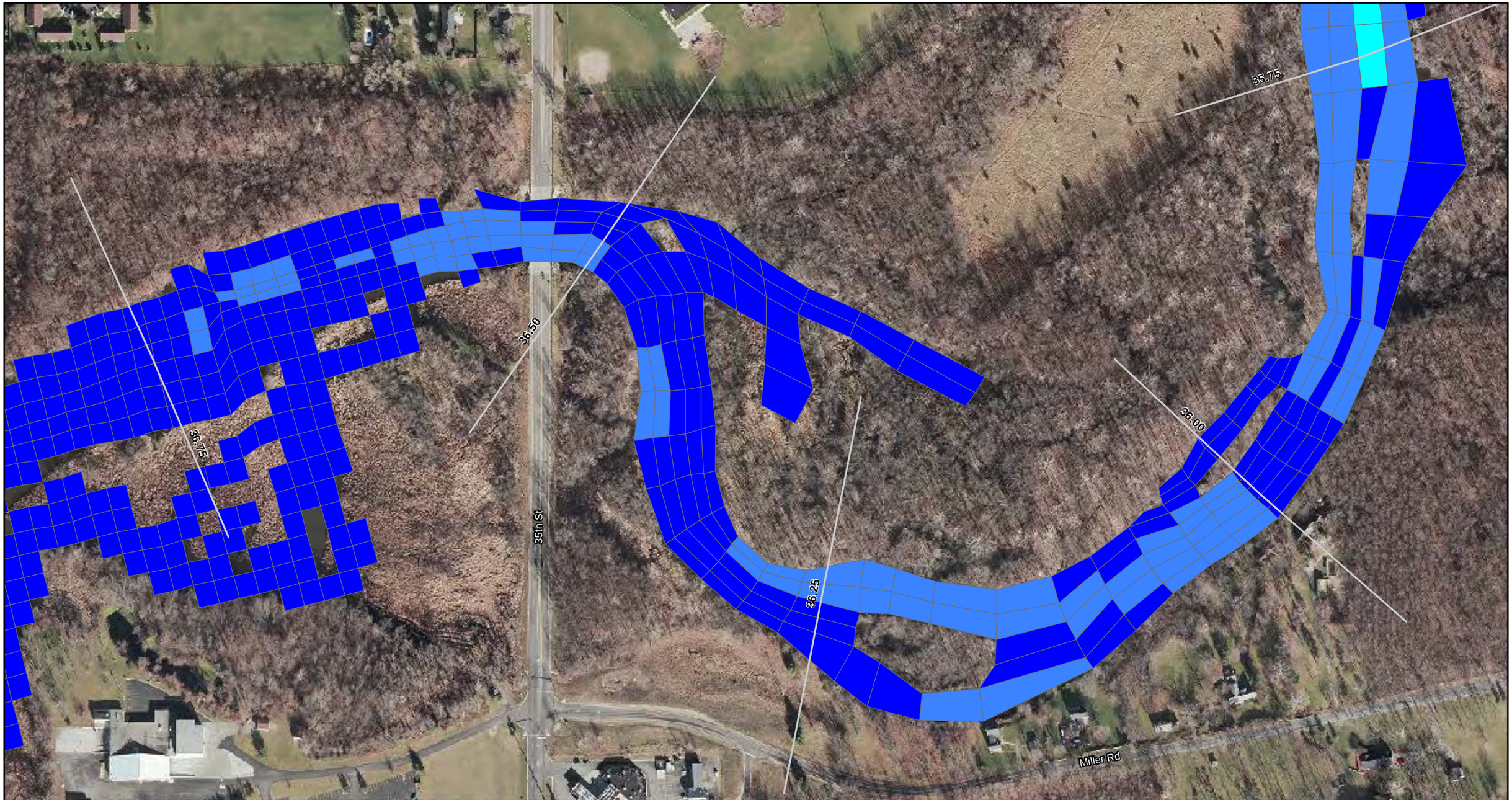
MP 34.70 - MP 35.75

SHEET 46 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

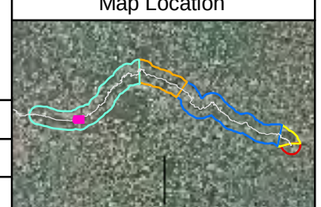
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

Aerial Photography Date: November 2011



Drawn:	BRS 3/22/2012
Approved:	DBR 3/22/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

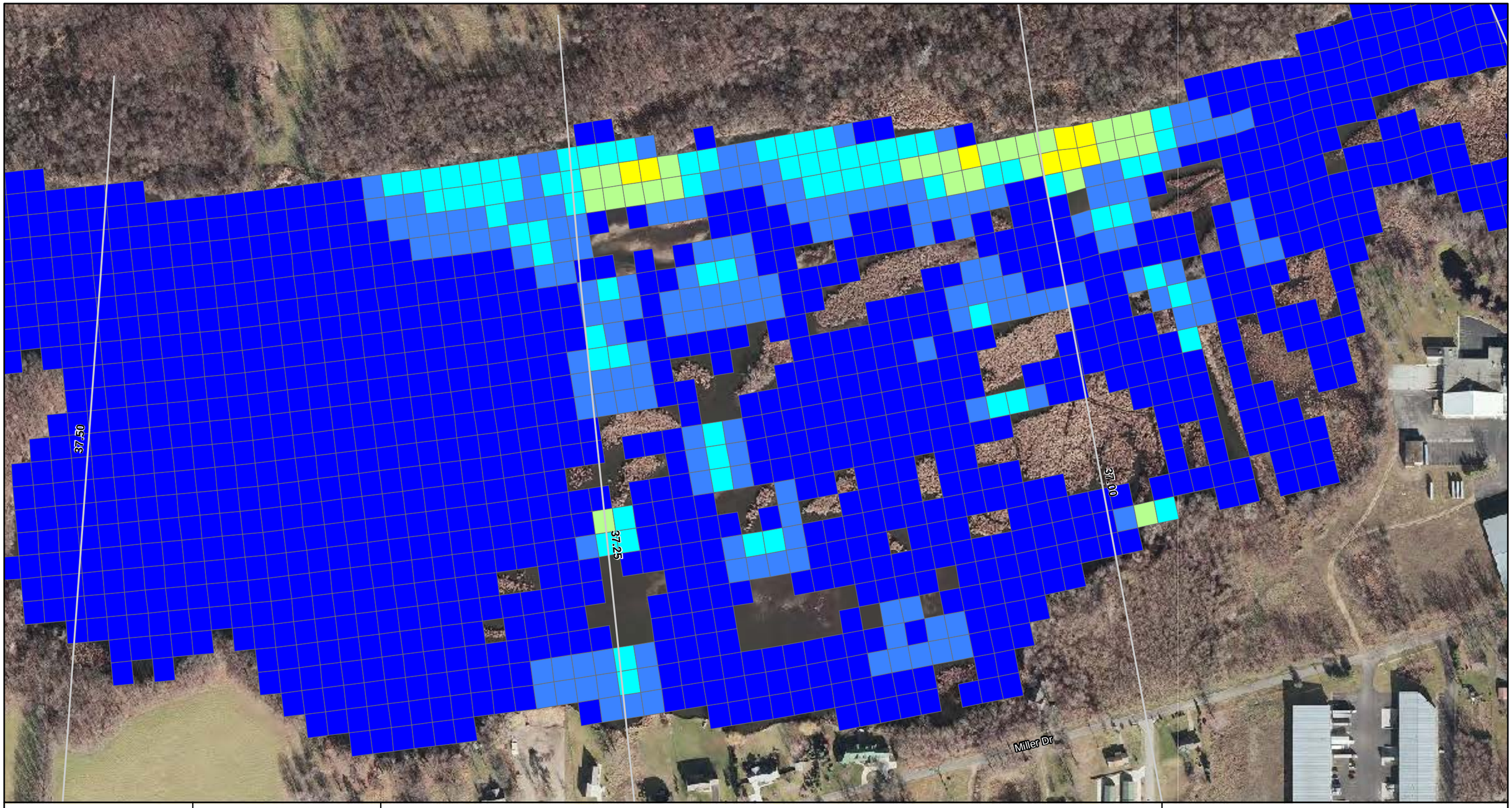
MP 35.75 - MP 36.80

SHEET 47 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

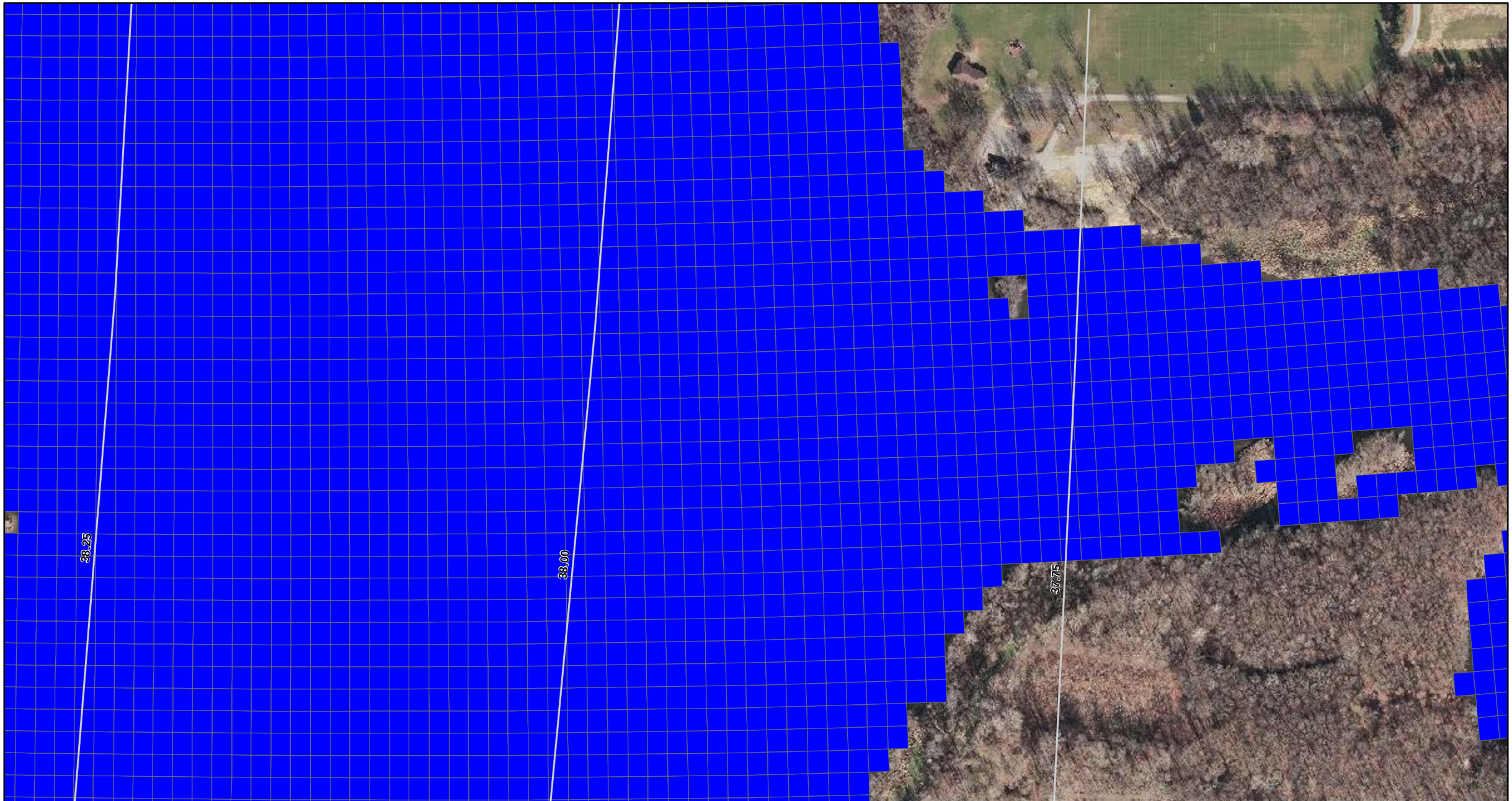
MP 36.80 - MP 37.55

SHEET 48 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

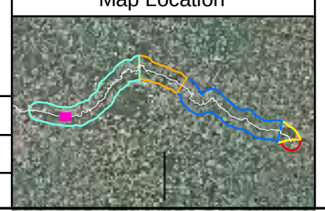
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

MP 37.55 - MP 38.30

SHEET 49 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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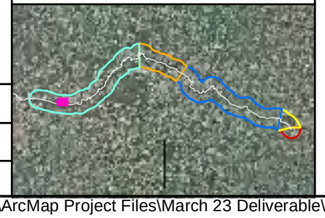
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

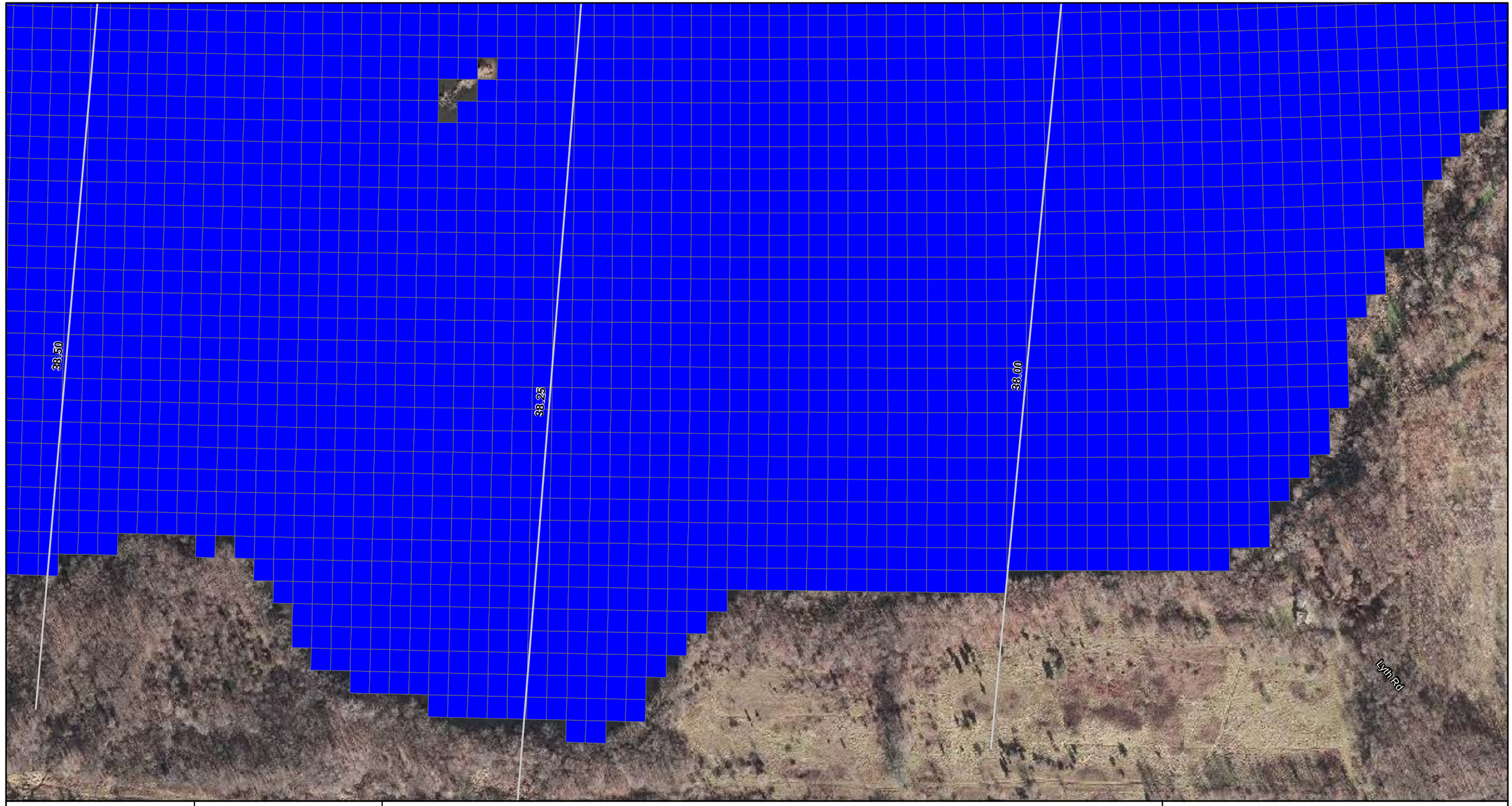
MP 37.80 - MP 38.60N

SHEET 50 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

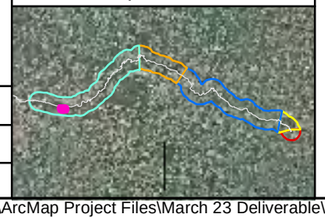
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

MP 37.80 - MP 38.60S

SHEET 51 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

39.00

38.75

38.50

38.25

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

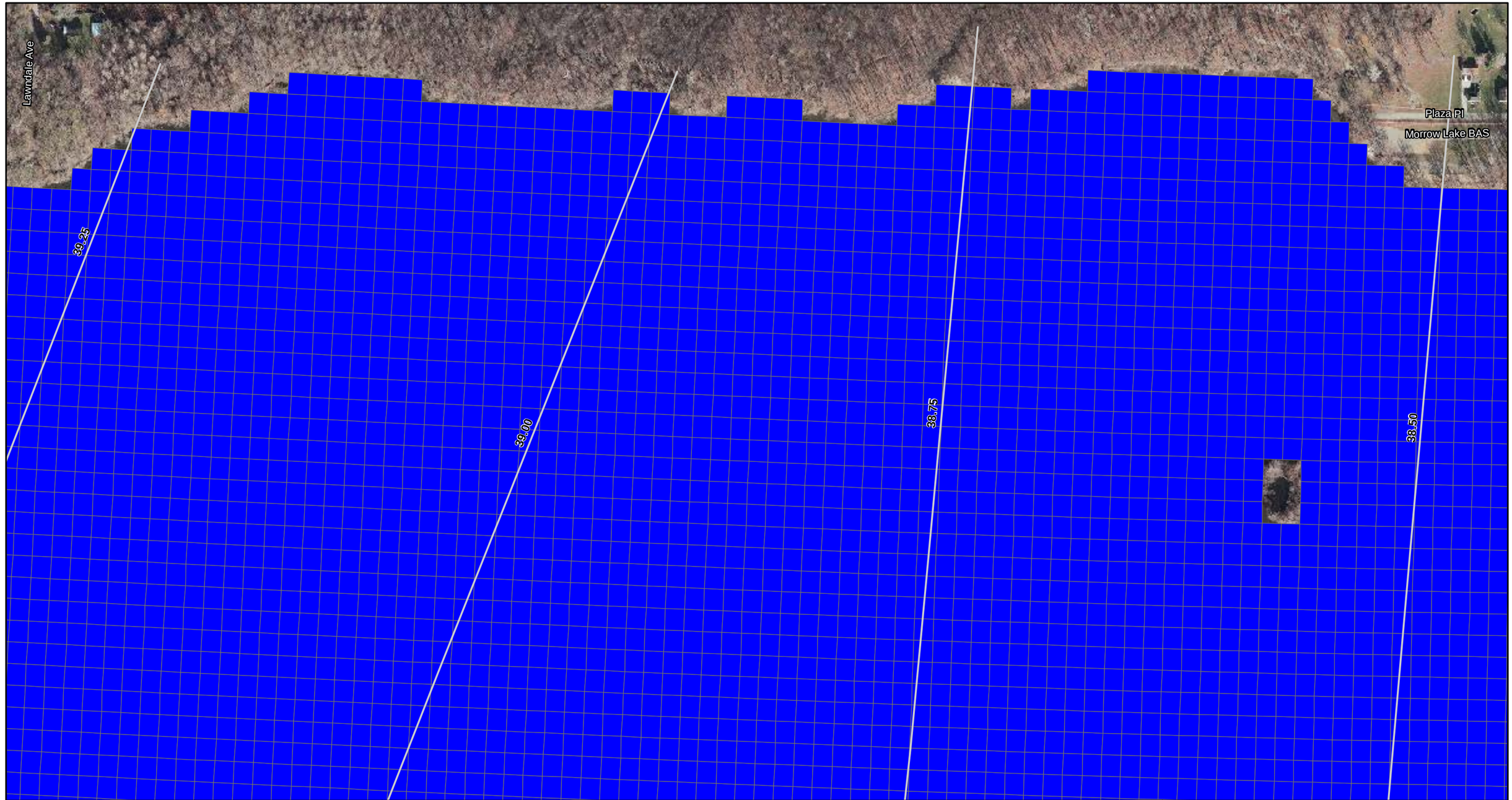
MP 38.25 - MP 39.00C

SHEET 52 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

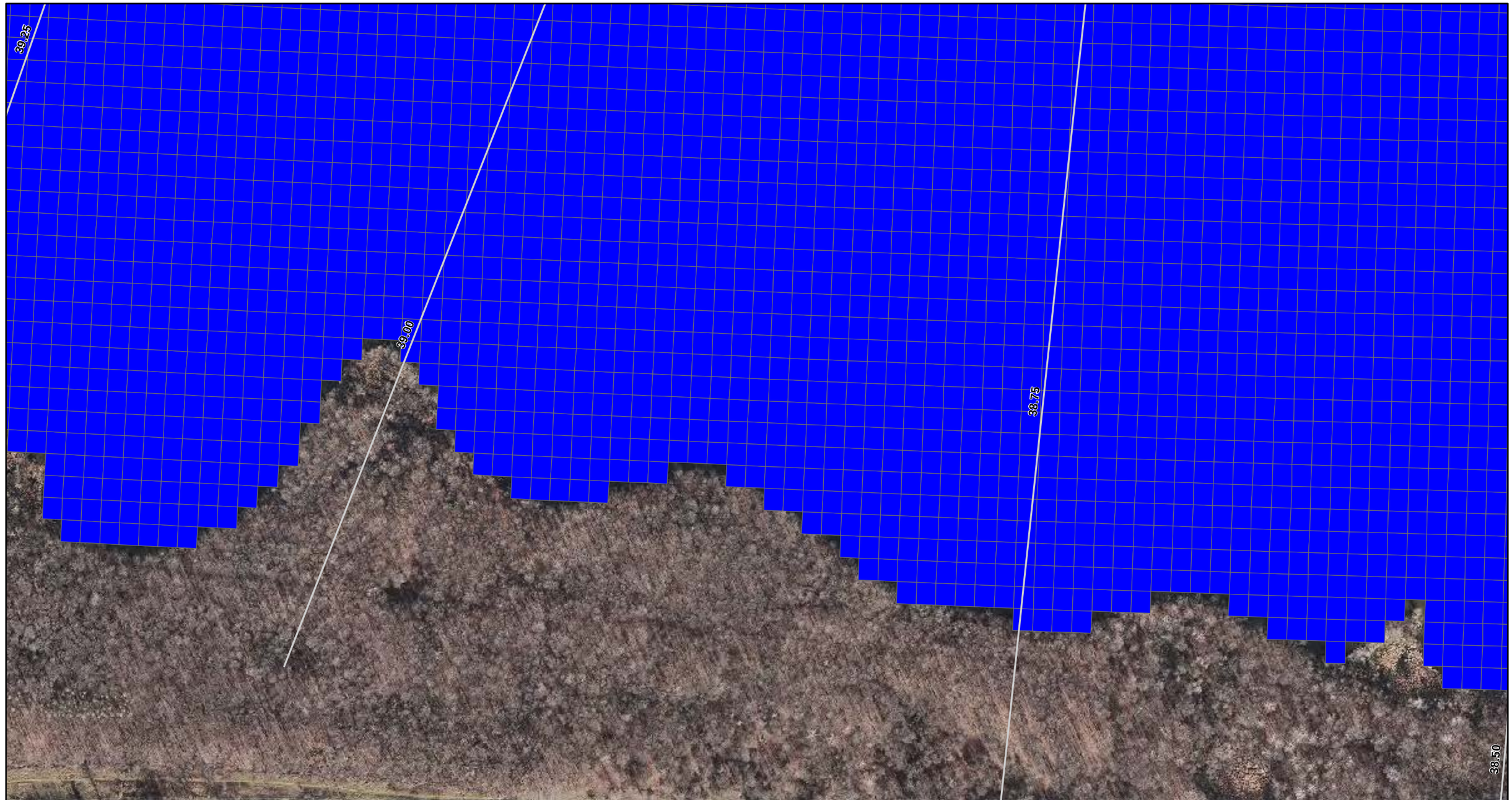
MP 38.50 - MP 39.25N

SHEET 53 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

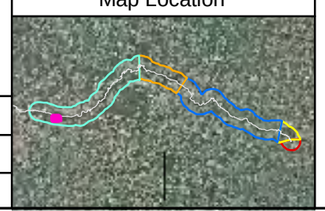
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

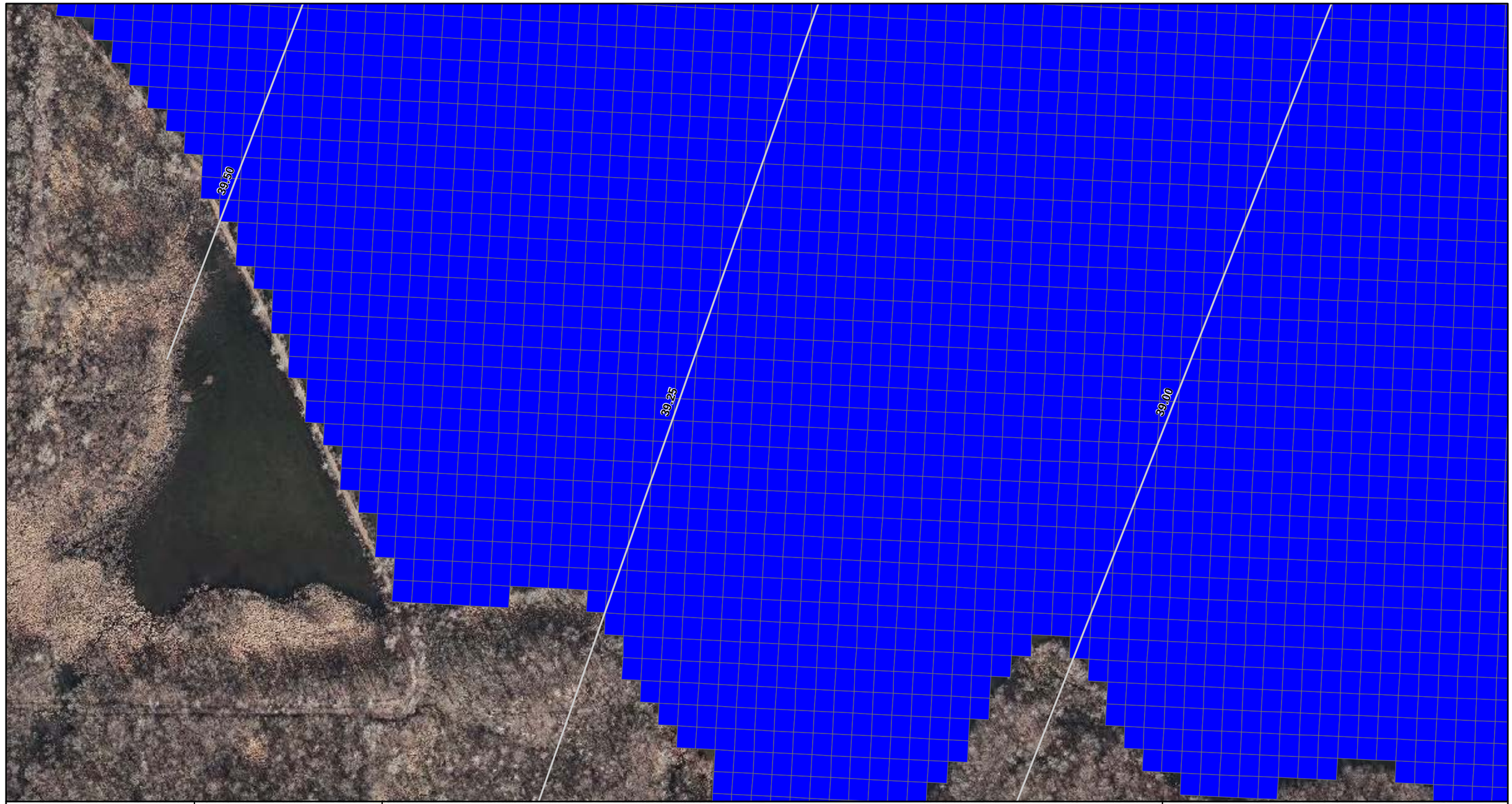
MP 38.50 - MP 39.25S

SHEET 54 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

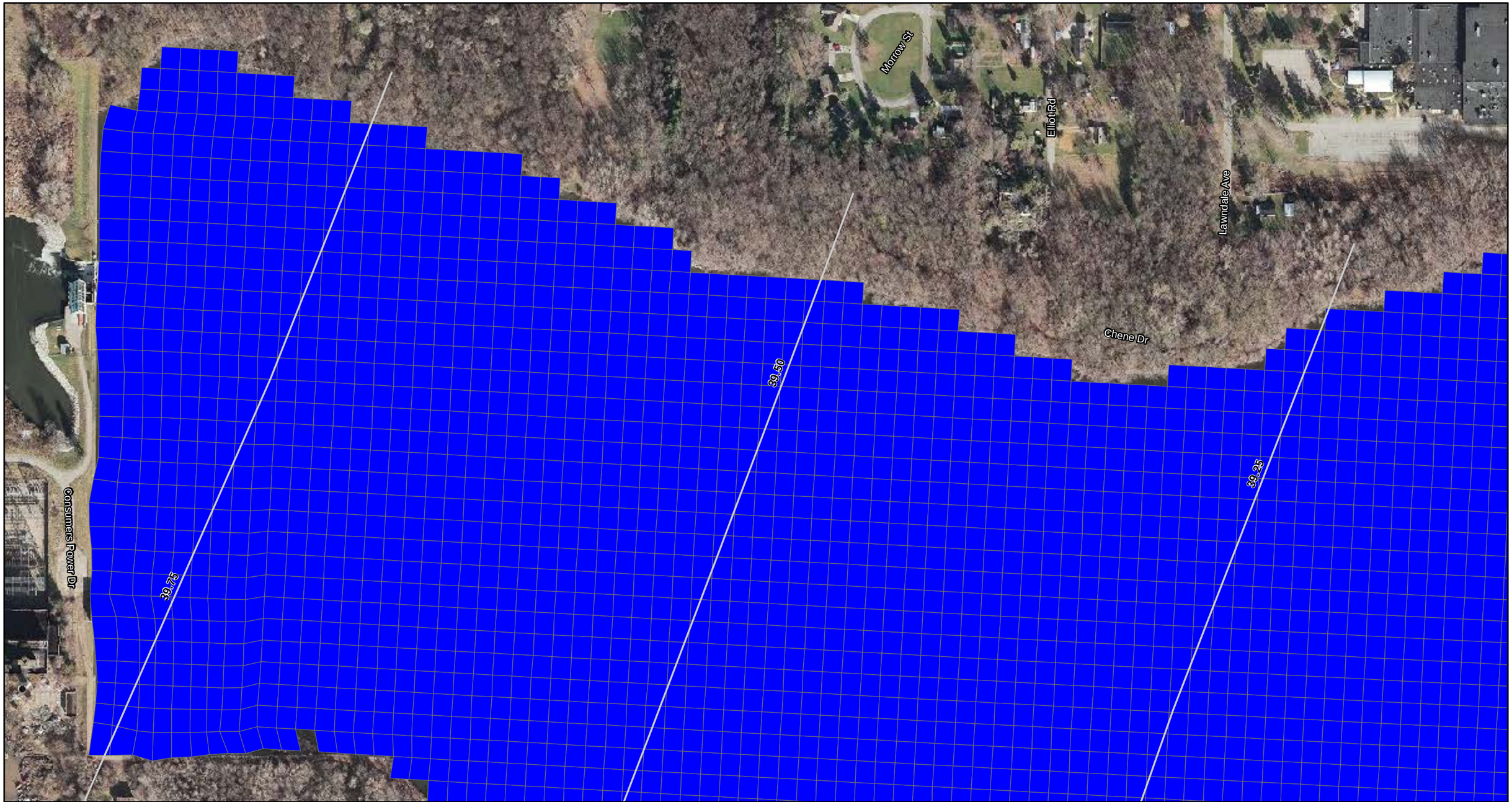
MP 38.90 - MP 39.60S

SHEET 55 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep9_2010.mxd

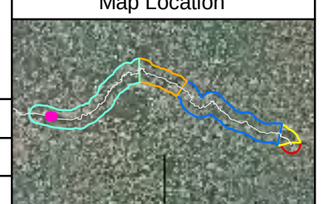
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 9, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 467 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 9, 2010

MP 39.15 - MP 39.85

SHEET 56 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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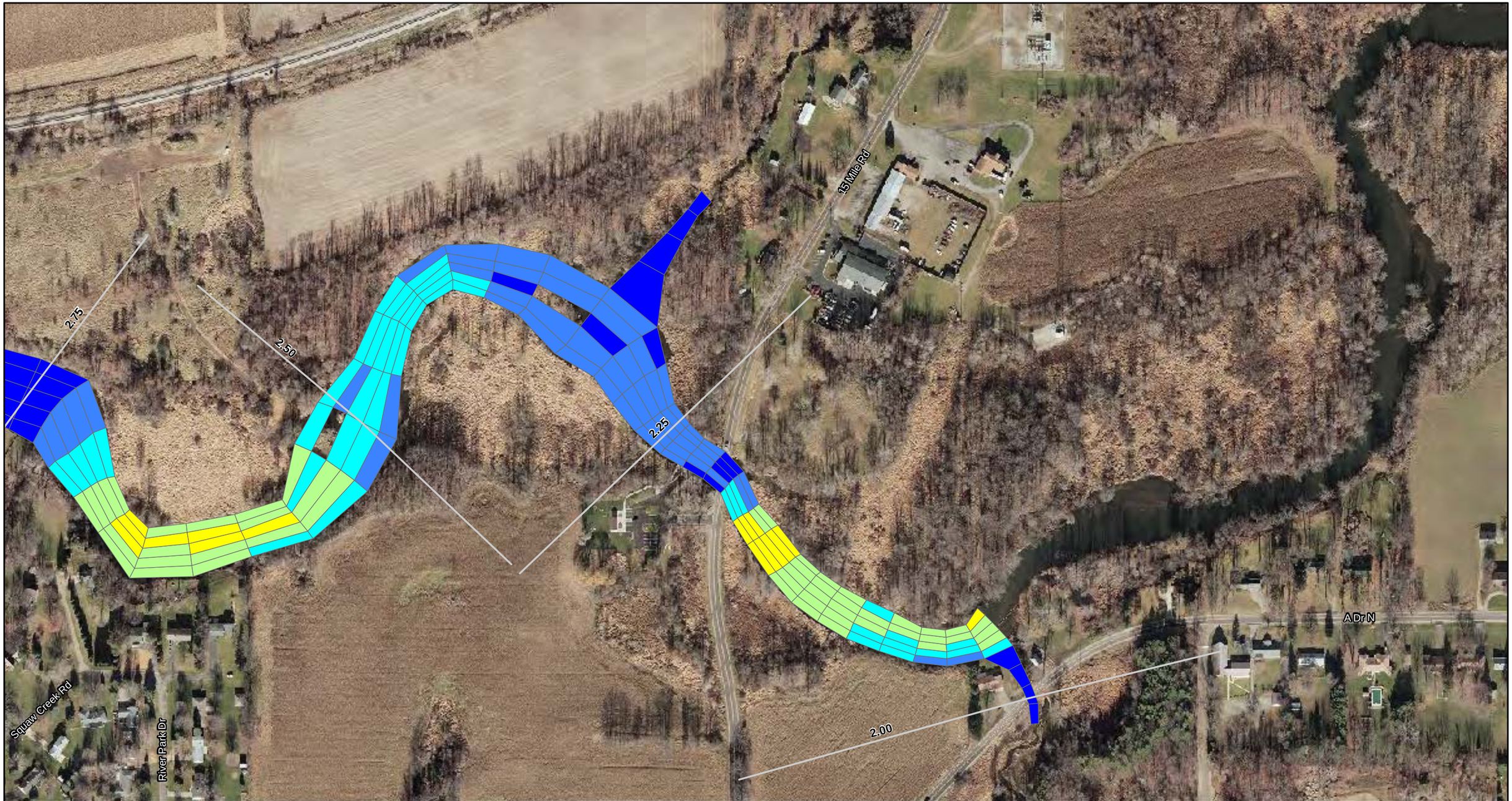
Aerial Photography Date: November 2011

Figure 6-8

Riverine Grid: Bed Shear Stress

September 10, 2010

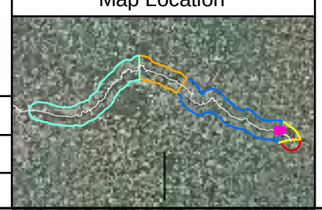
Sheets 1 through 56



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

MP 01.95 - MP 02.75

SHEET 1 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep10_2010.mxd

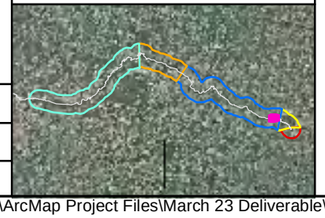
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

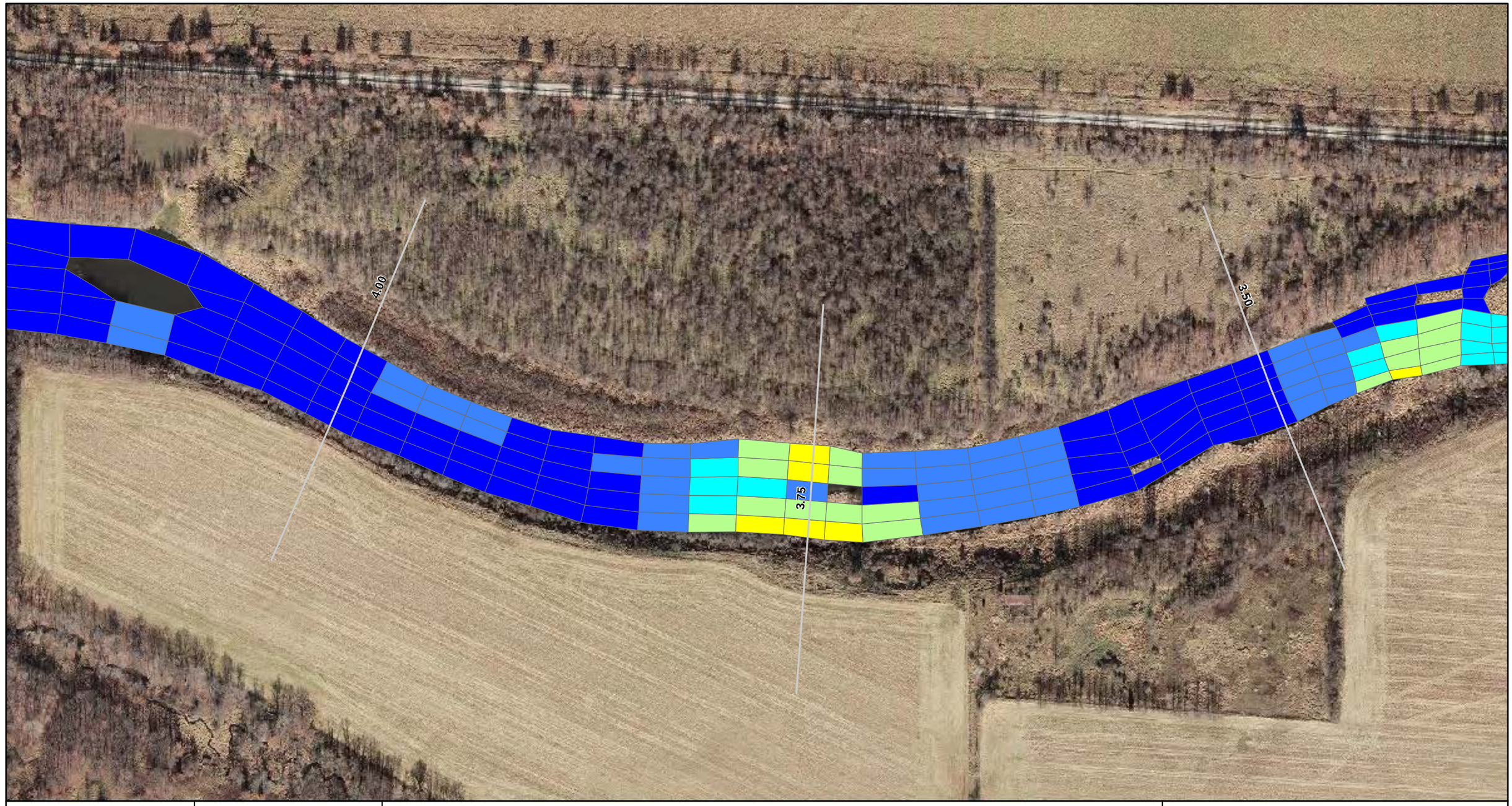
MP 02.60 - MP 03.40

SHEET 2 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep10_2010.mxd

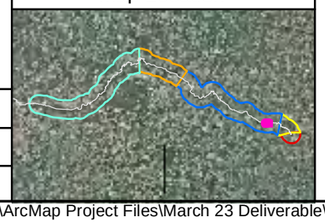
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

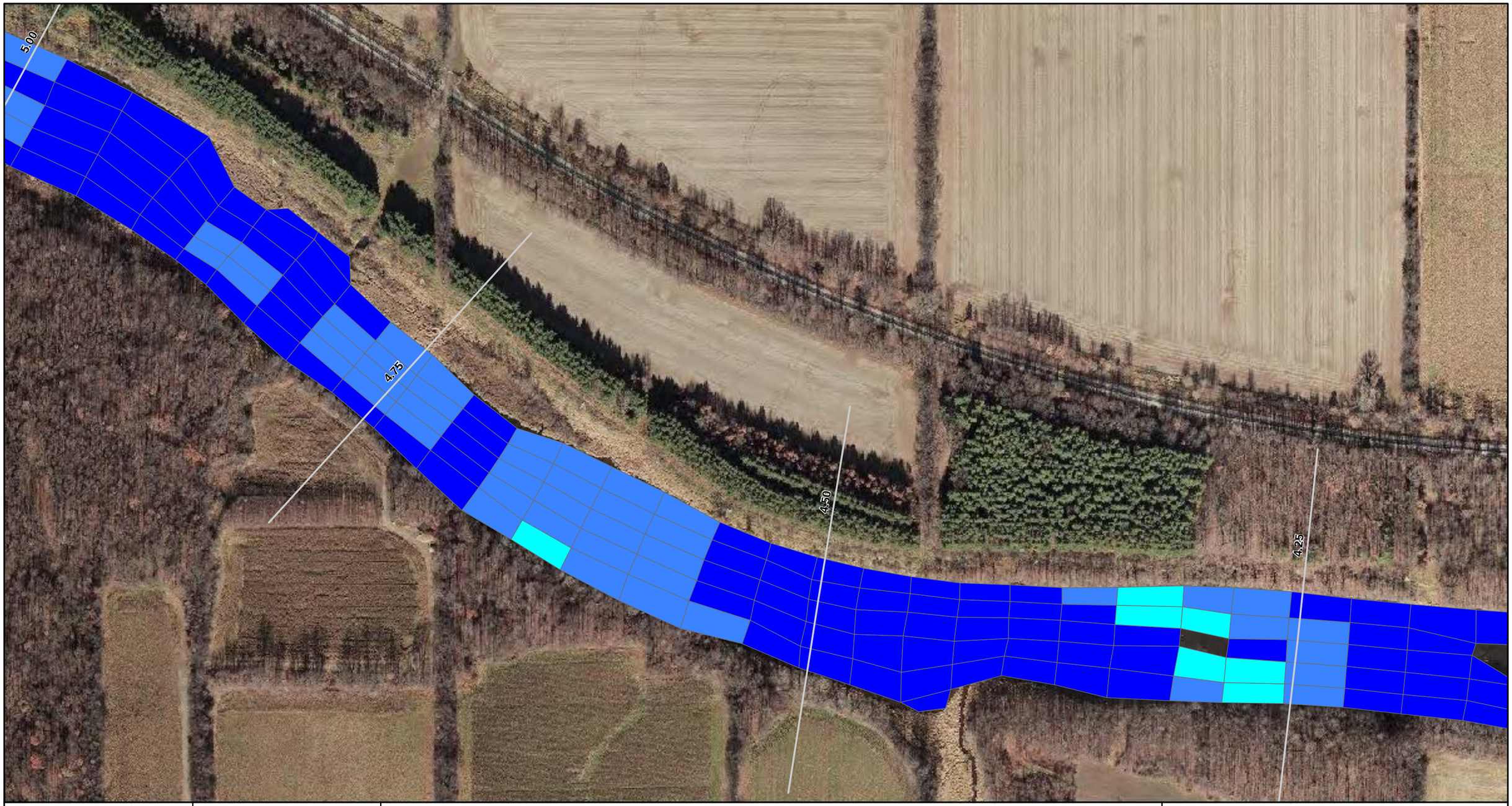
MP 03.40 - MP 04.20

SHEET 3 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep10_2010.mxd

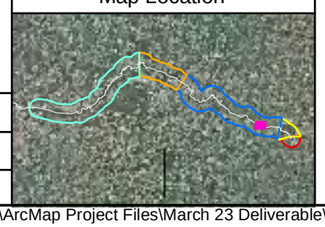
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

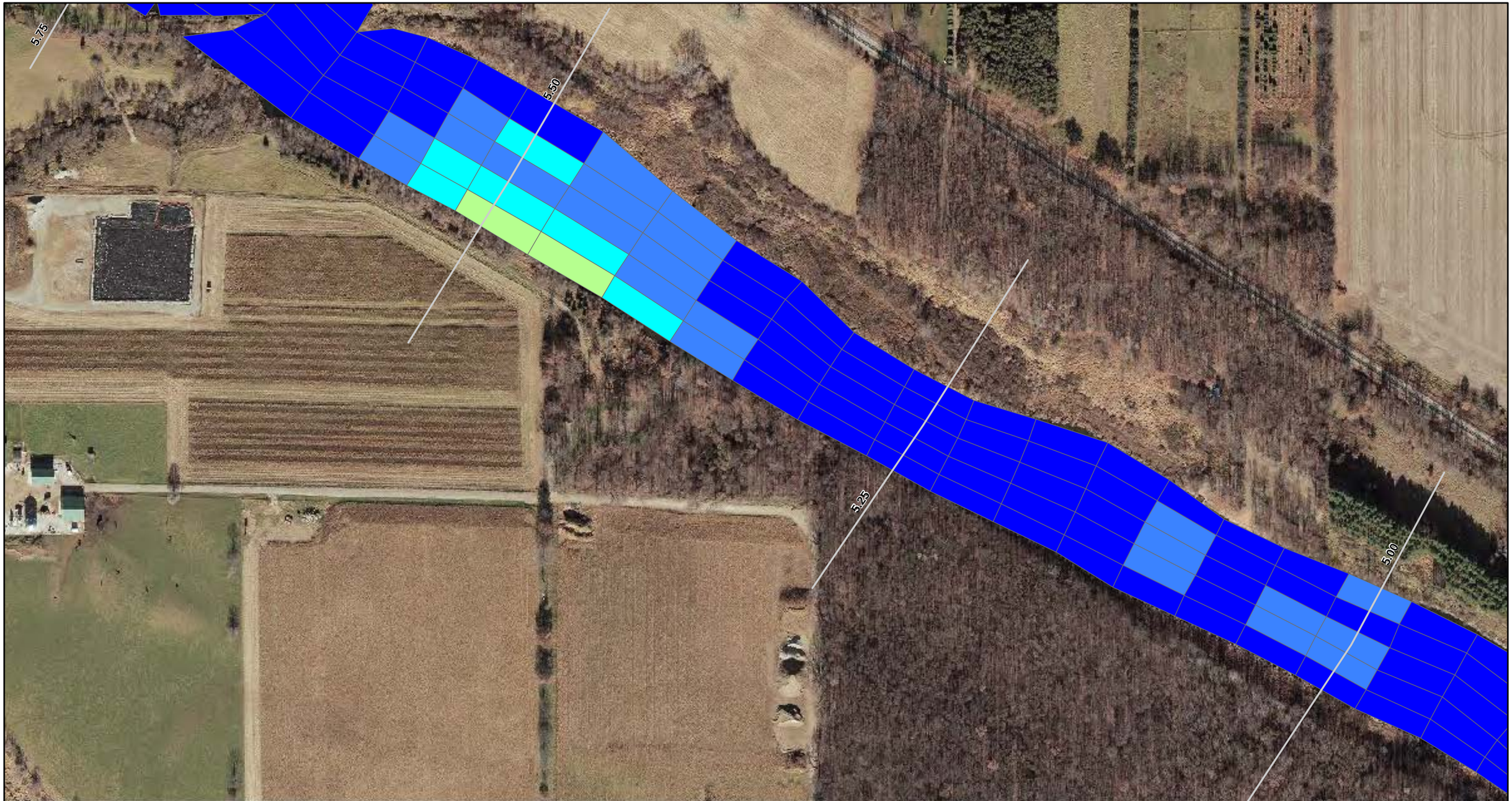
MP 04.15 - MP 05.00

SHEET 4 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



Drawn:	BRS 3/22/2012
Approved:	DBR 3/22/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

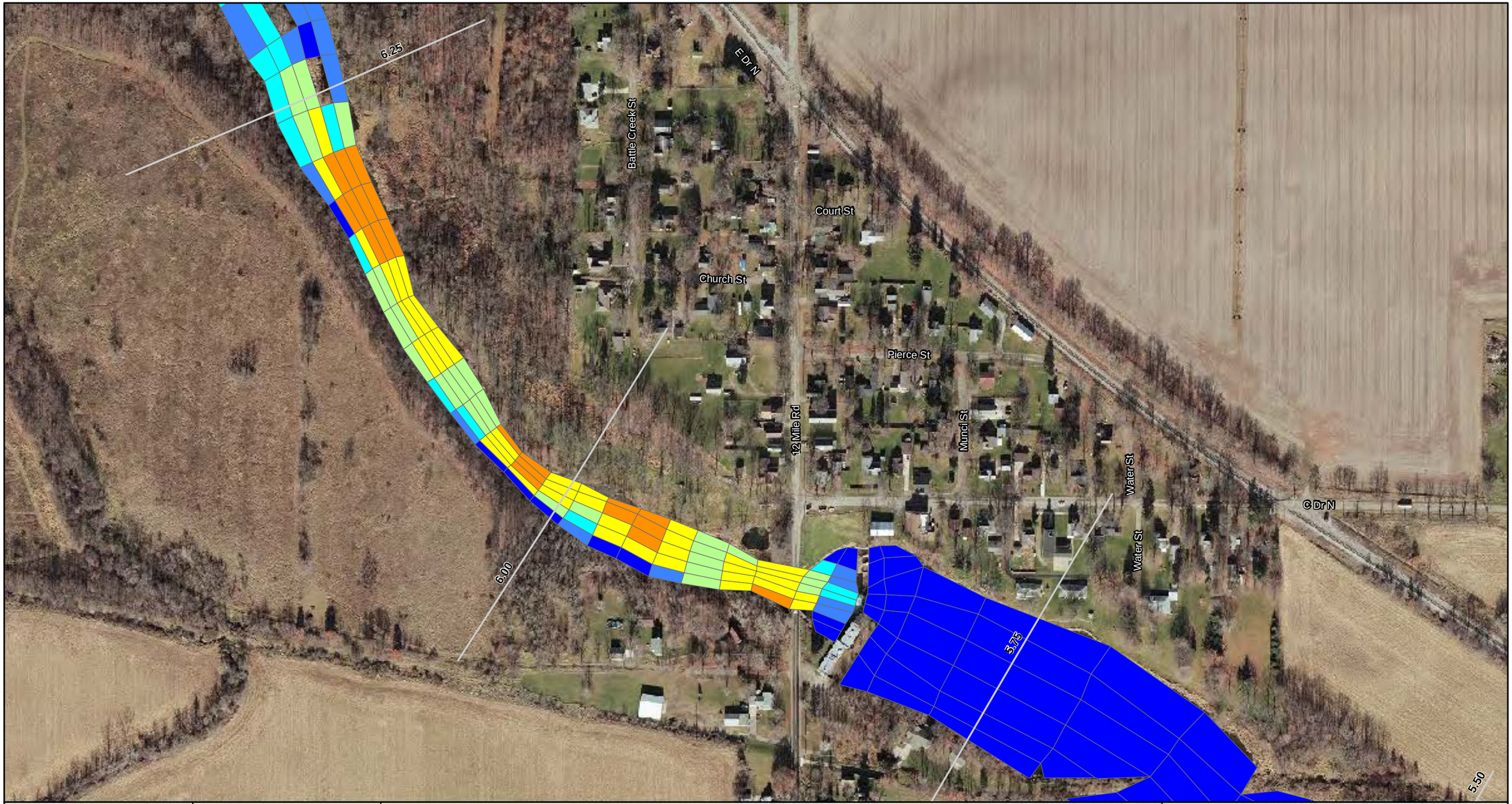
MP 04.90 - MP 05.65

SHEET 5 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep10_2010.mxd

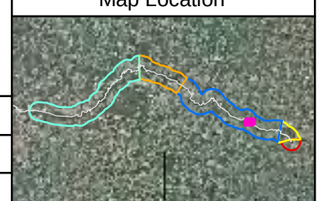
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

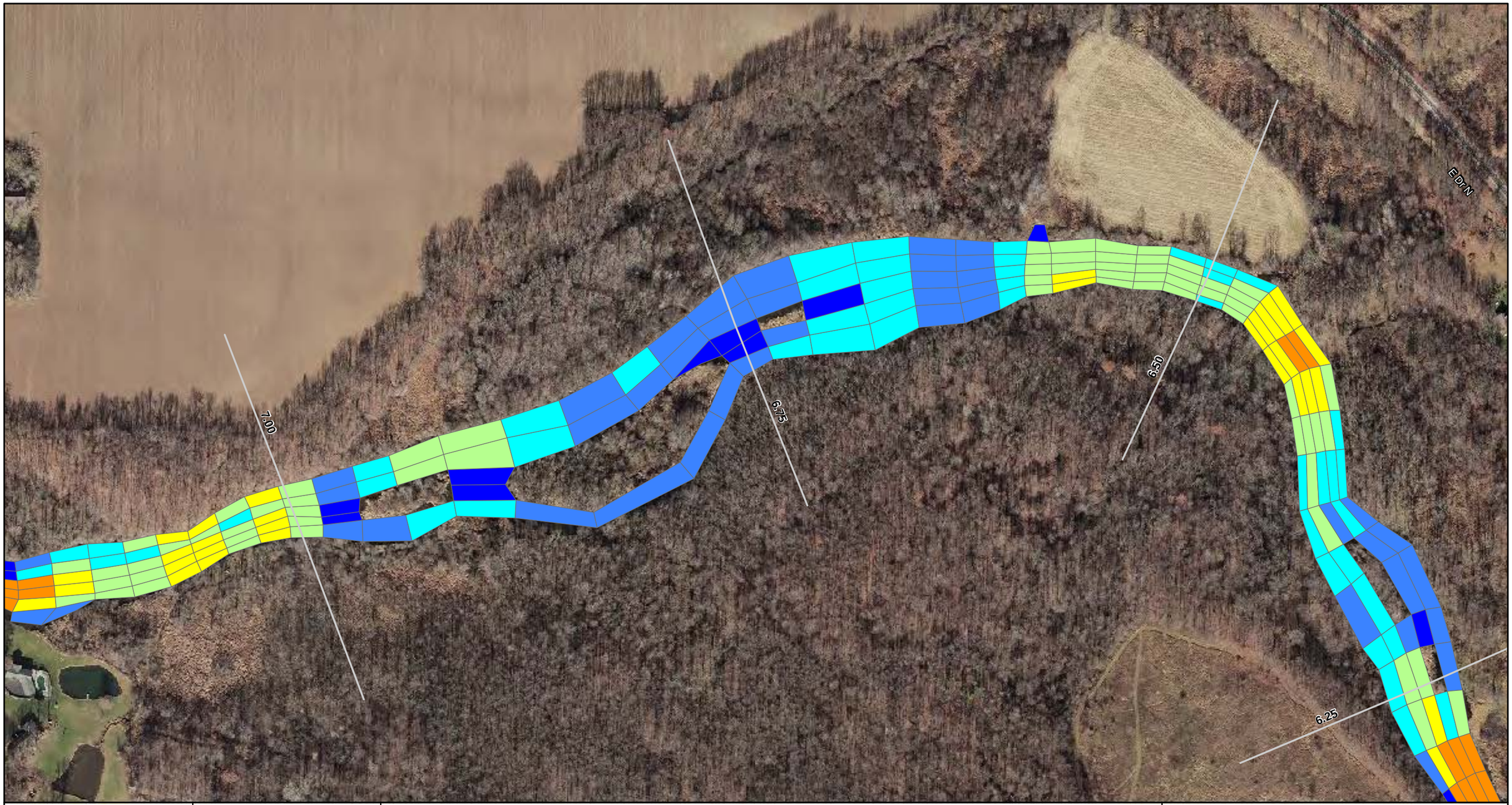
MP 05.65 - MP 06.30

SHEET 6 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep10_2010.mxd

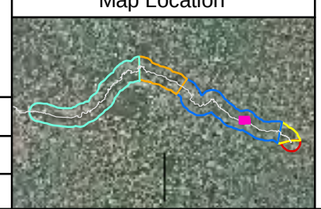
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010
- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

MP 06.20 - MP 07.15

SHEET 7 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

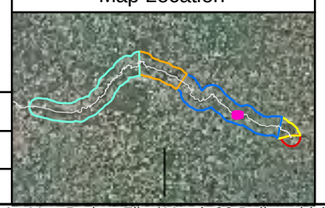
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep10_2010.mxd

Aerial Photography Date: November 2011



Drawn:	BRS 3/22/2012
Approved:	DBR 3/22/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

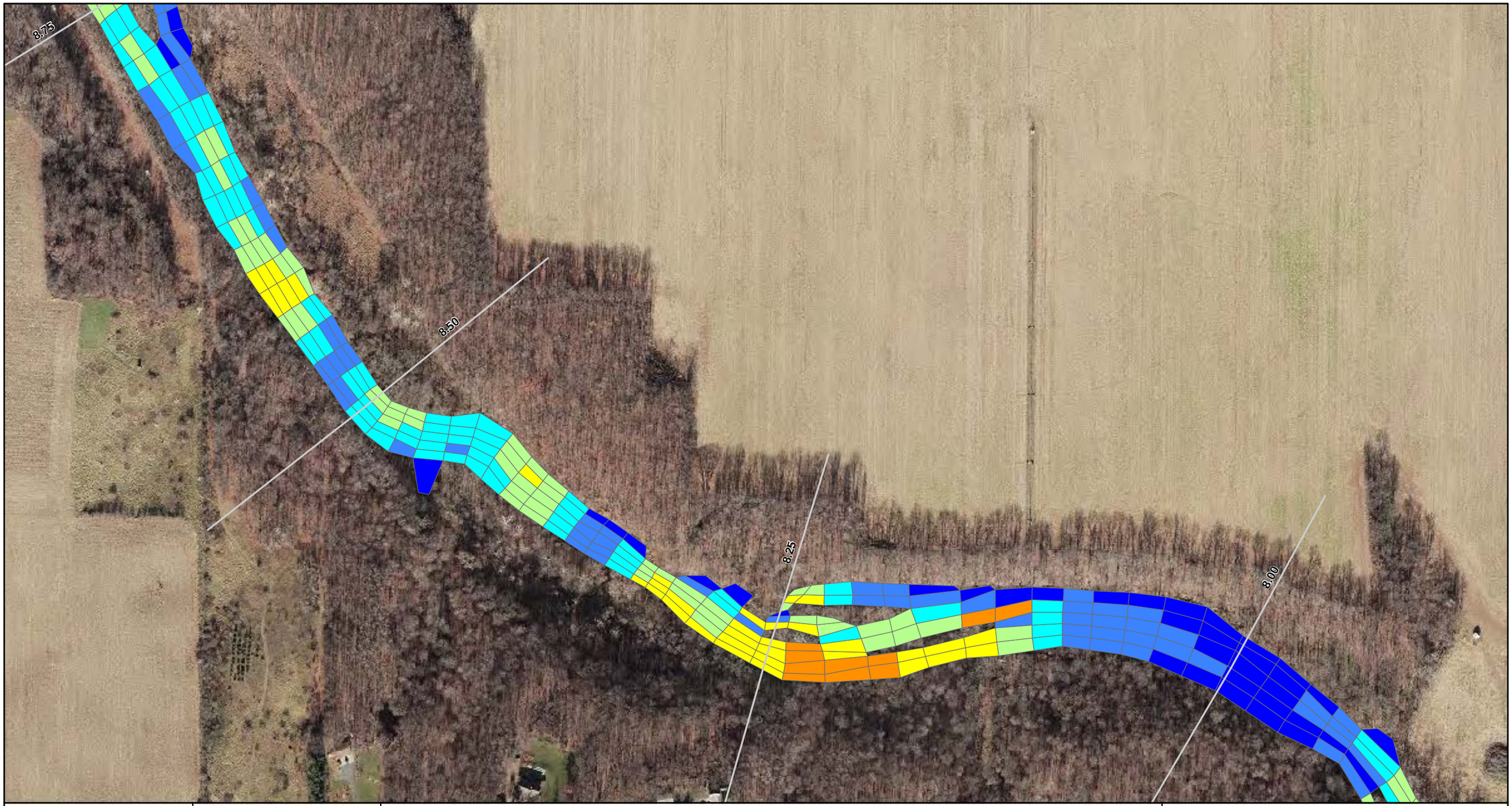
MP 07.15 - MP 07.95

SHEET 8 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep10_2010.mxd

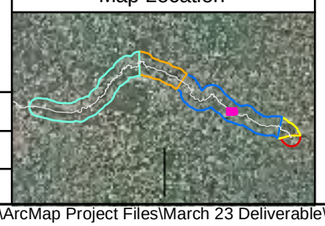
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

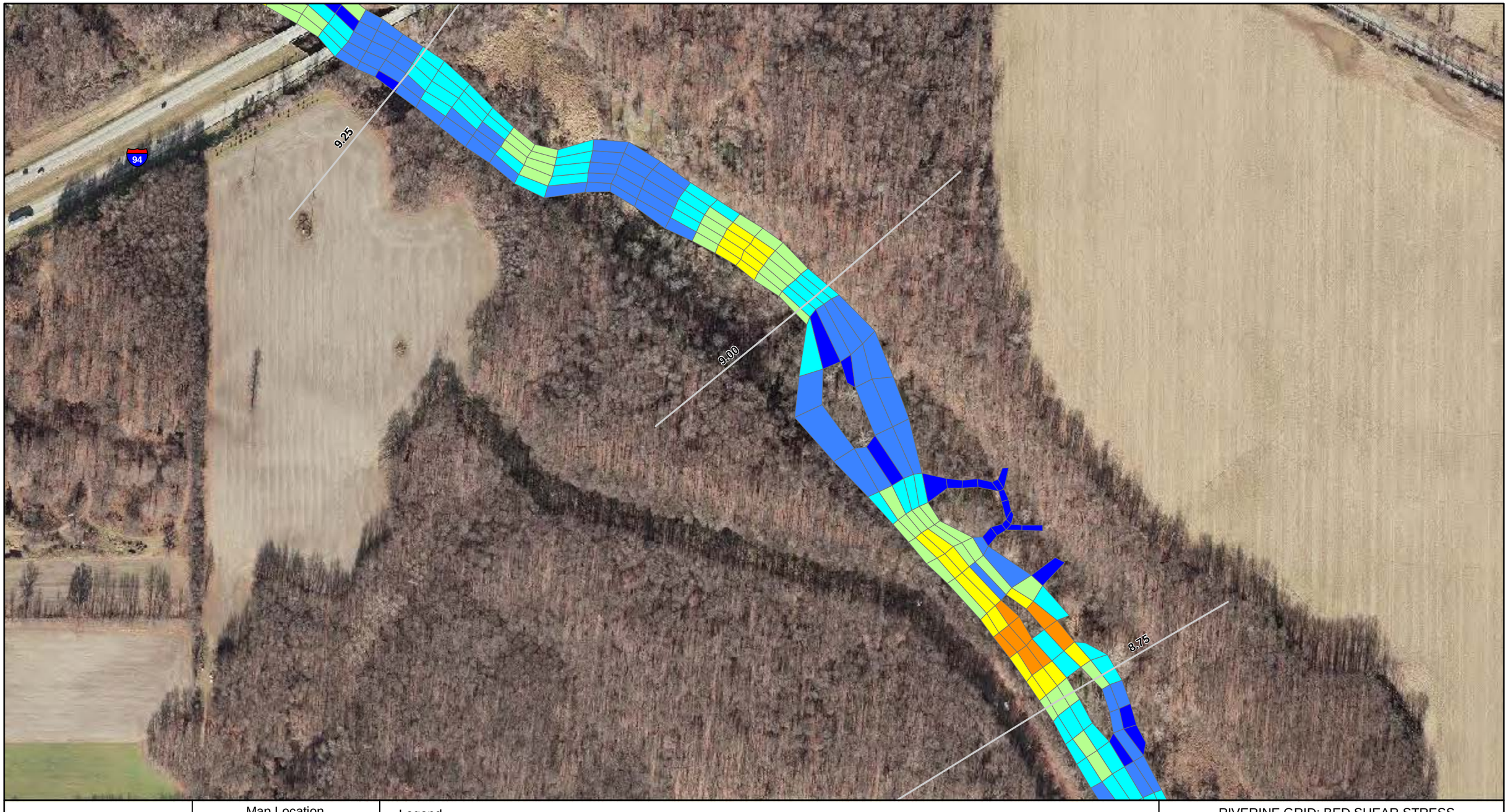
MP 07.90 - MP 08.75

SHEET 9 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep10_2010.mxd

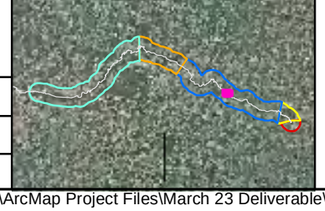
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

MP 08.70 - MP 09.30

SHEET 10 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
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- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

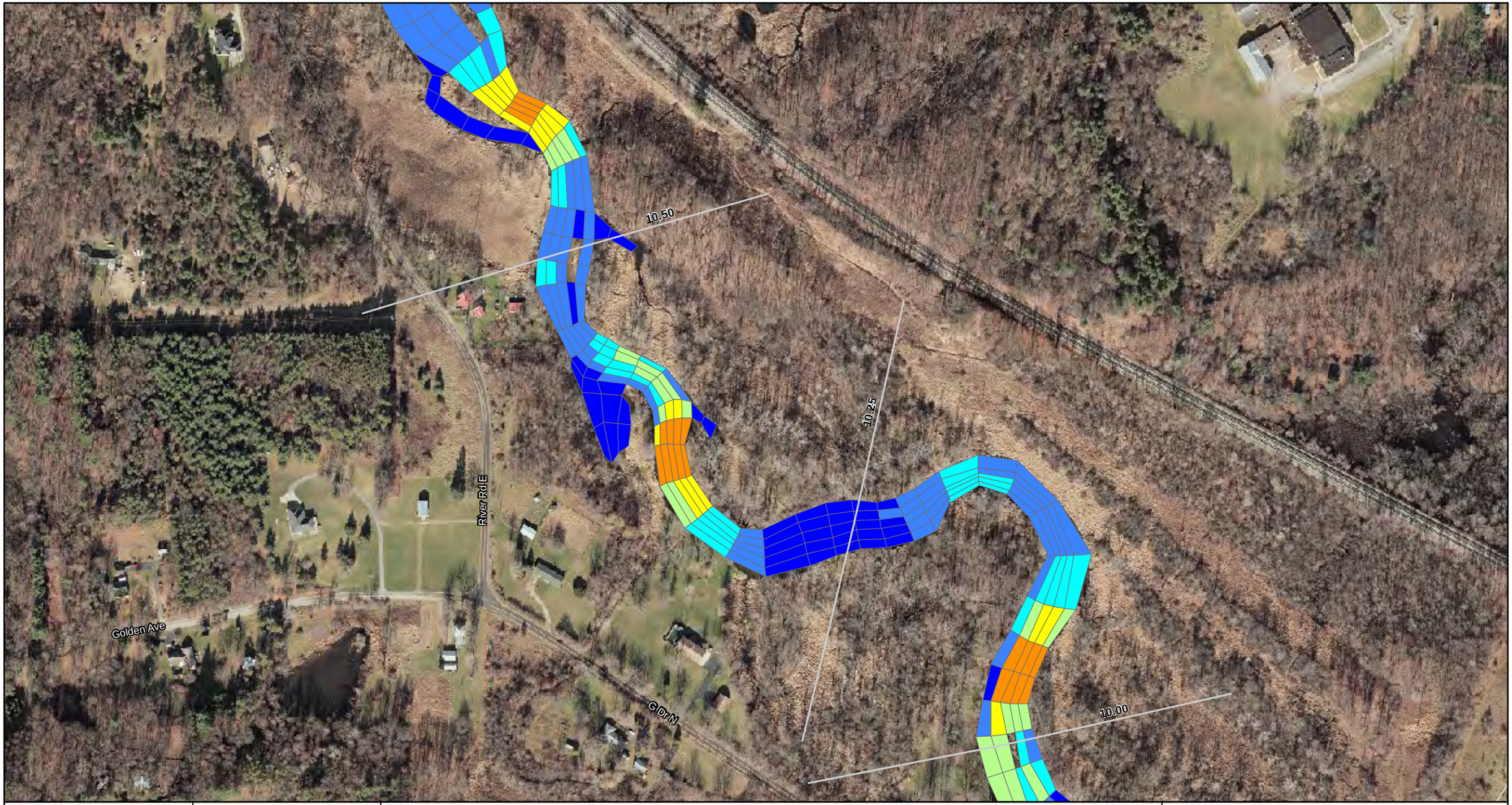
MP 09.25 - MP 10.05

SHEET 11 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep10_2010.mxd

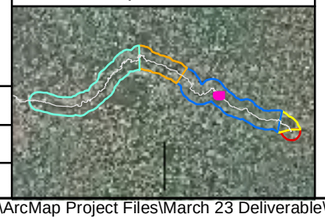
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

MP 10.00 - MP 10.65

SHEET 12 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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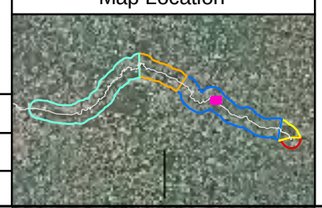
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

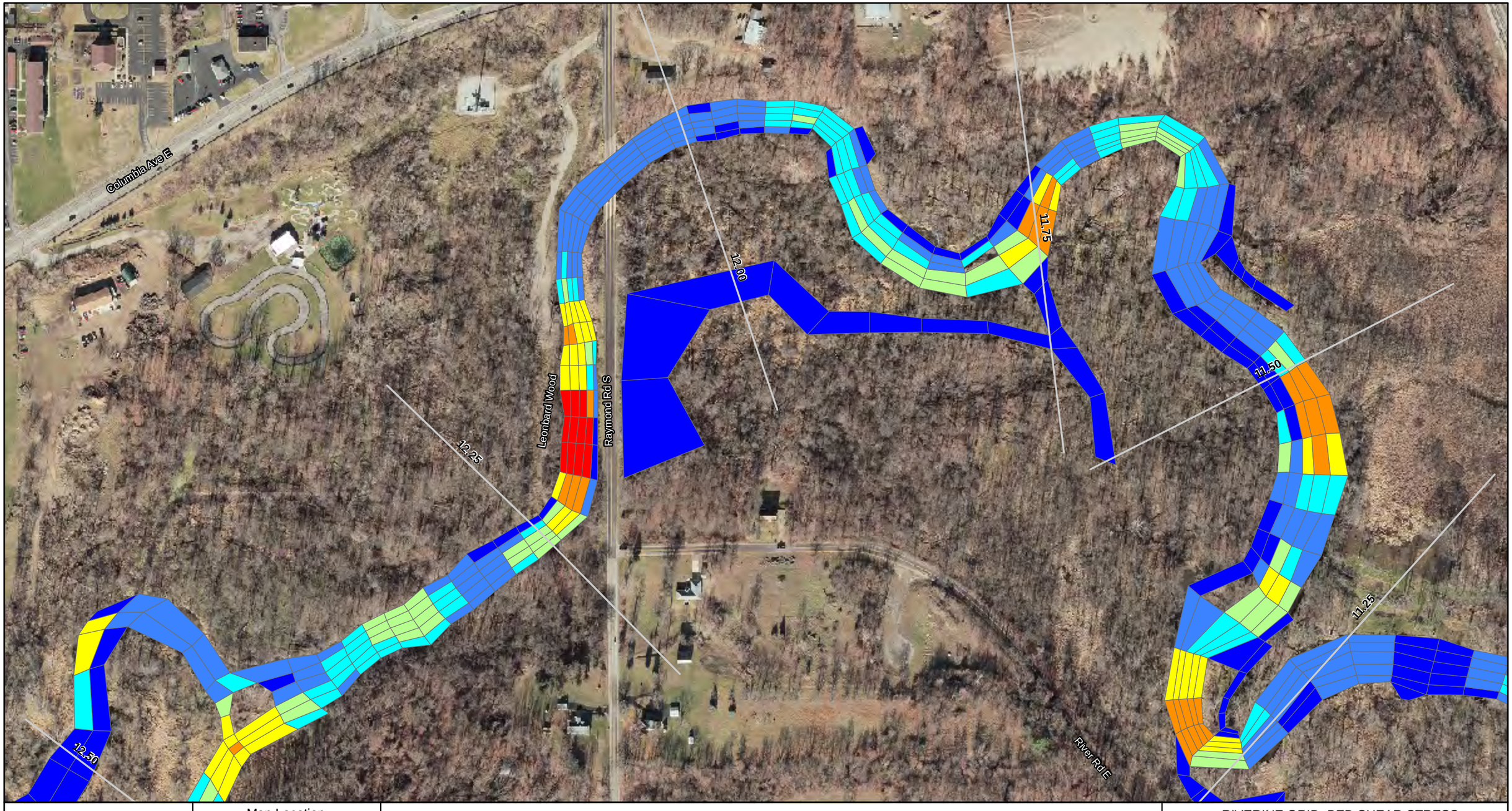
MP 10.60 - MP 11.40

SHEET 13 OF 56

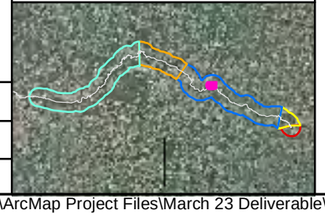
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep10_2010.mxd

Aerial Photography Date: November 2011



Map Location



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

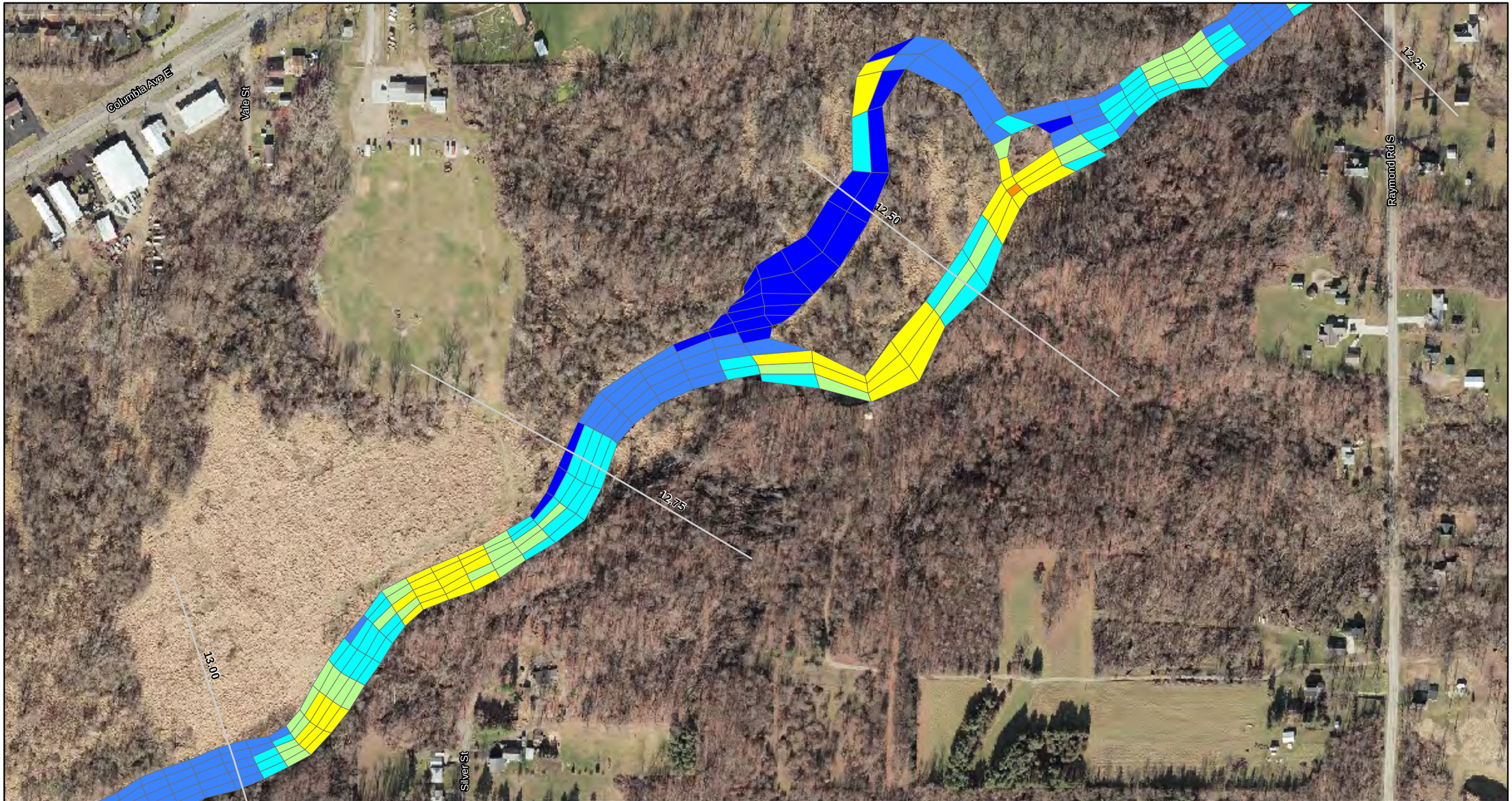
MP 11.10 - MP 12.45

SHEET 14 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep10_2010.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

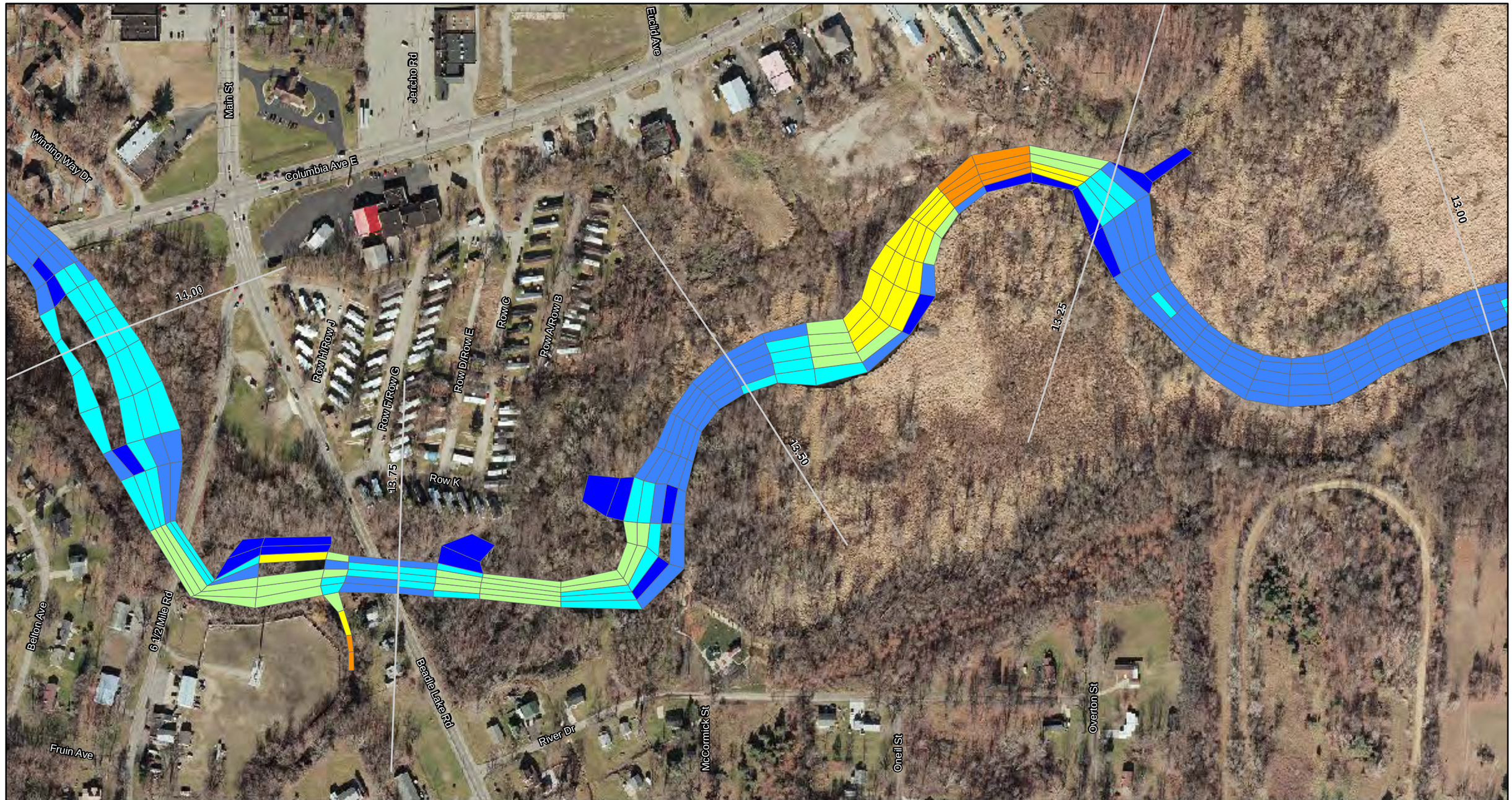
MP 12.30 - MP 13.05

SHEET 15 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep10_2010.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

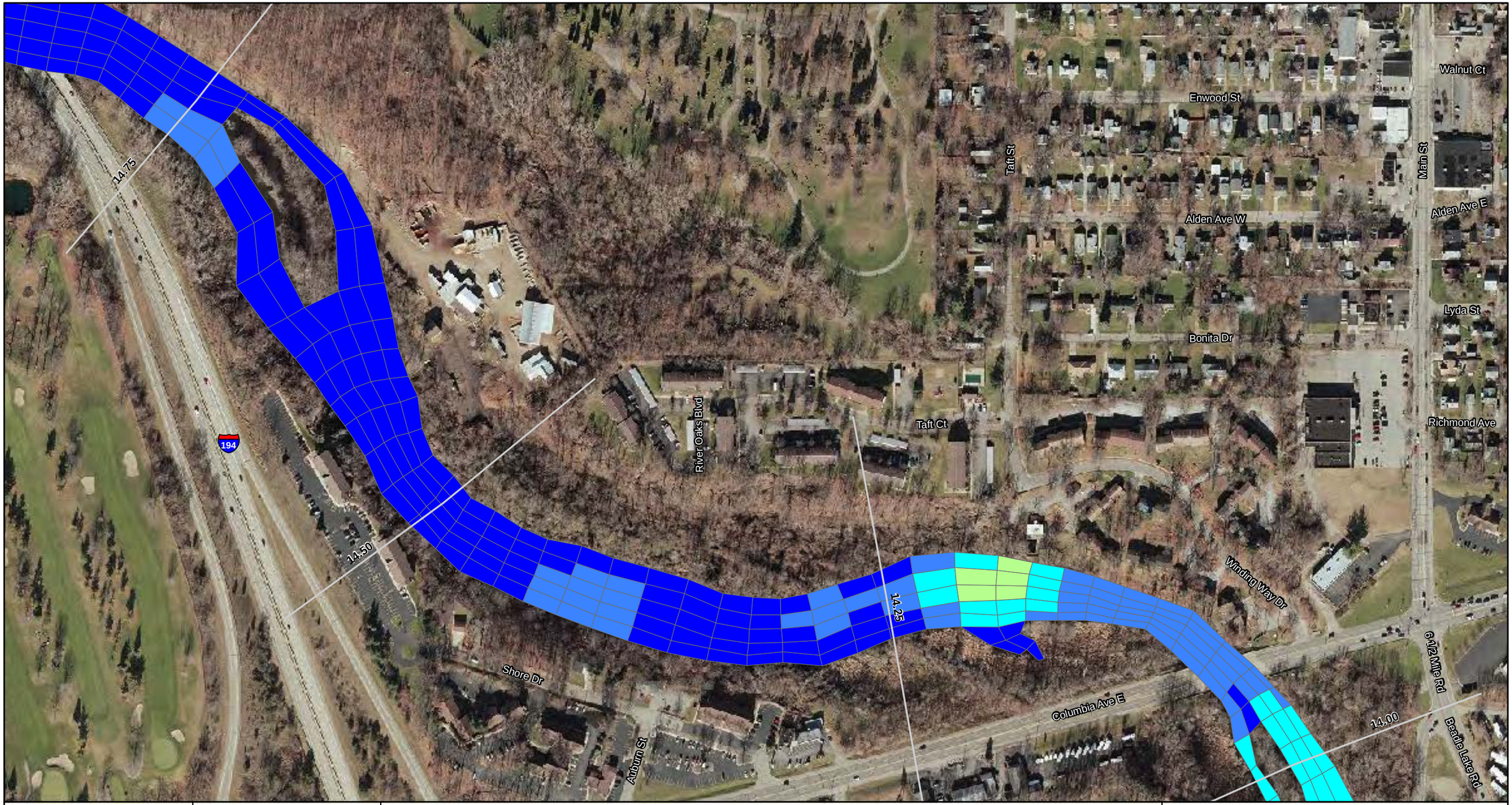
MP 13.00 - MP 14.10

SHEET 16 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep10_2010.mxd

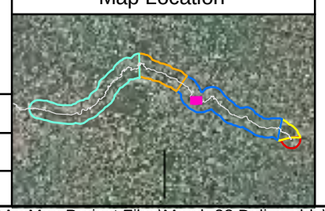
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

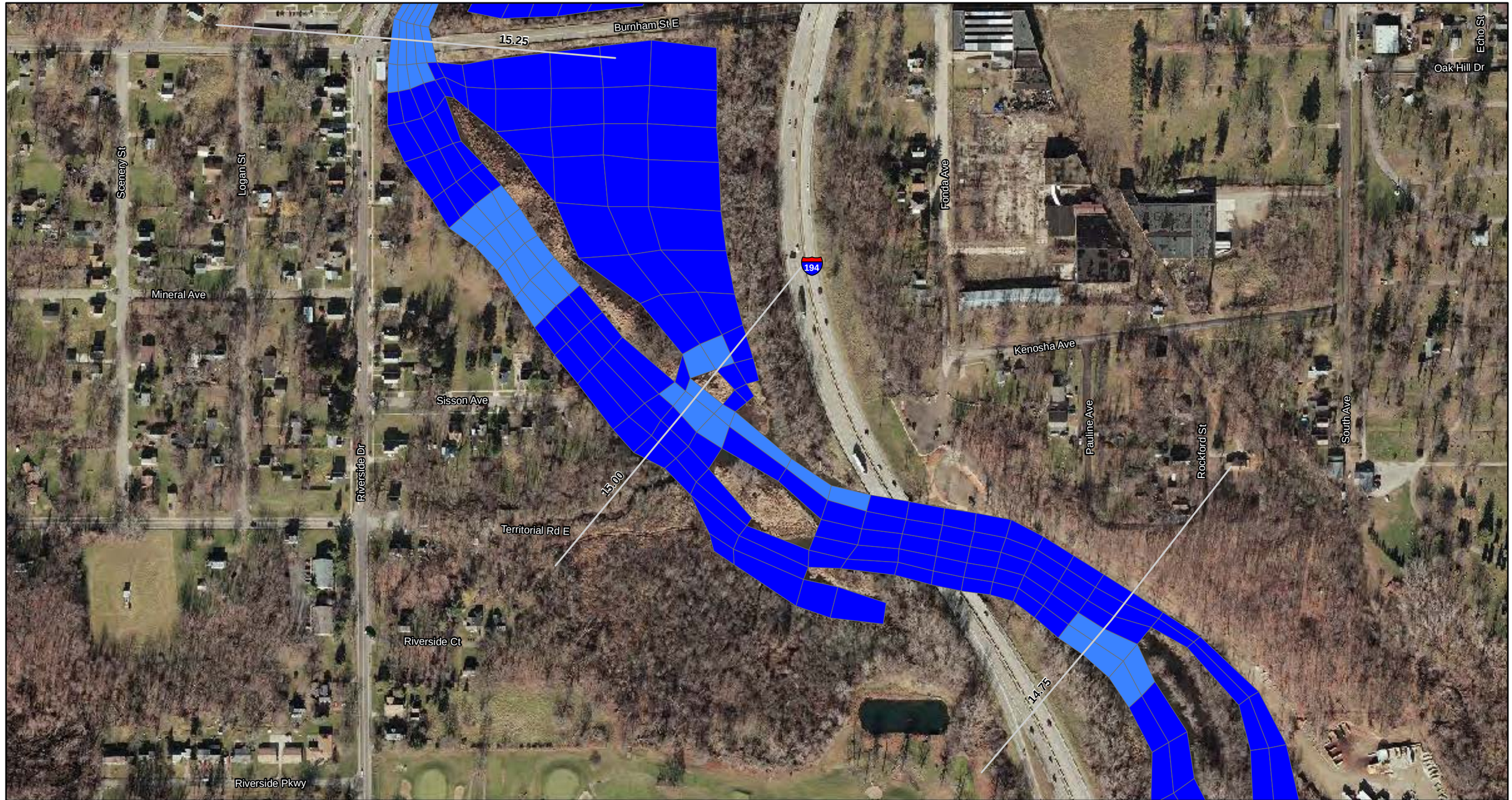
MP 14.00 - MP 14.85

SHEET 17 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



Drawn:	BRS 3/22/2012
Approved:	DBR 3/22/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
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- 10.000001 - 20.000000
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Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

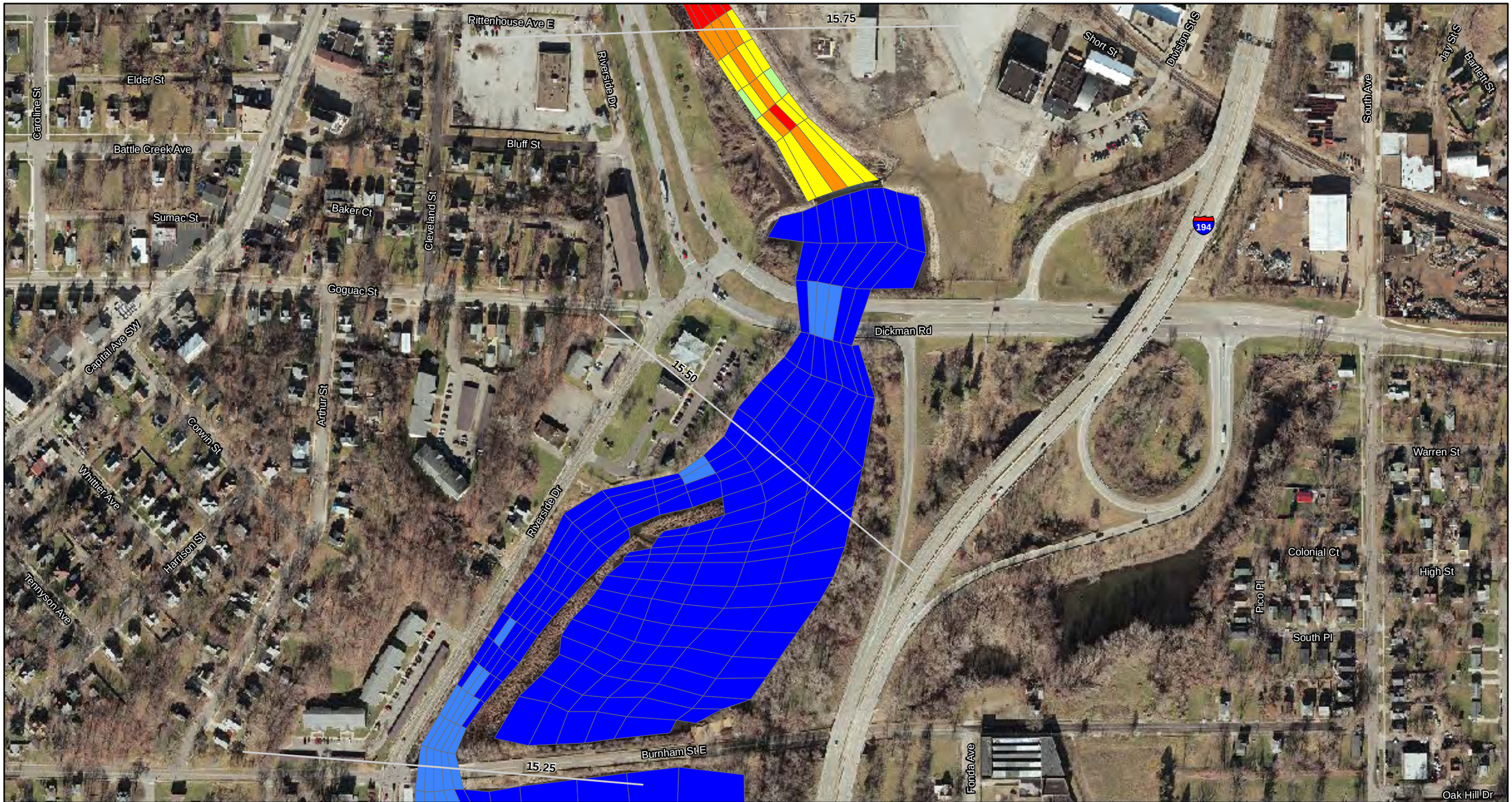
MP 14.65 - MP 15.25

SHEET 18 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
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Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

MP 15.25 - MP 15.75

SHEET 19 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep10_2010.mxd

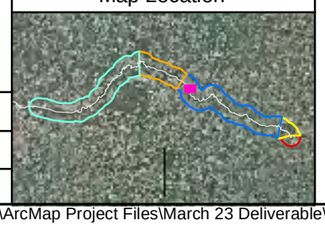
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

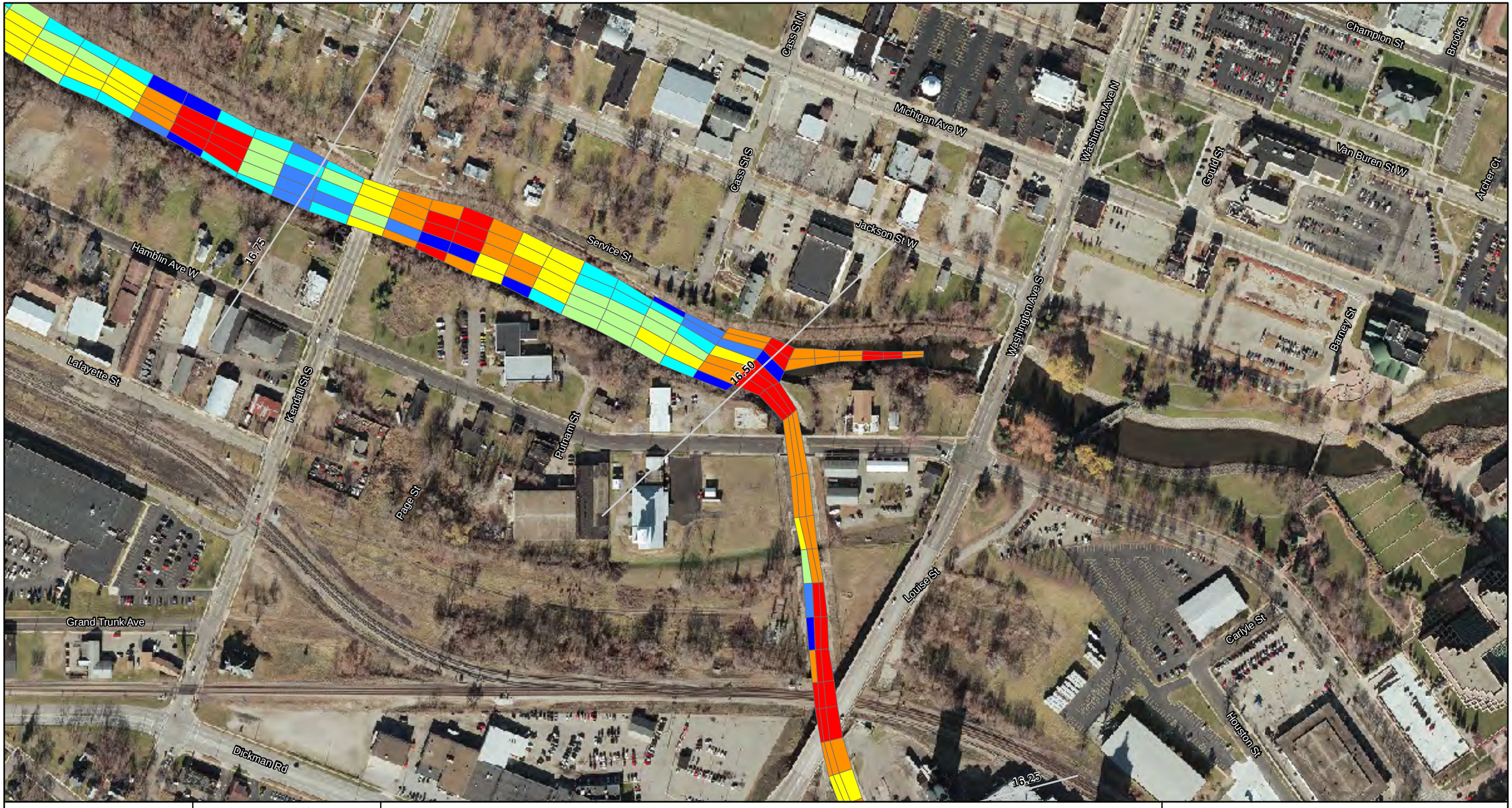
MP 15.75 - MP 16.30

SHEET 20 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep10_2010.mxd

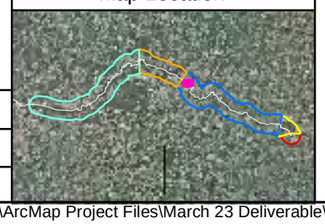
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
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- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

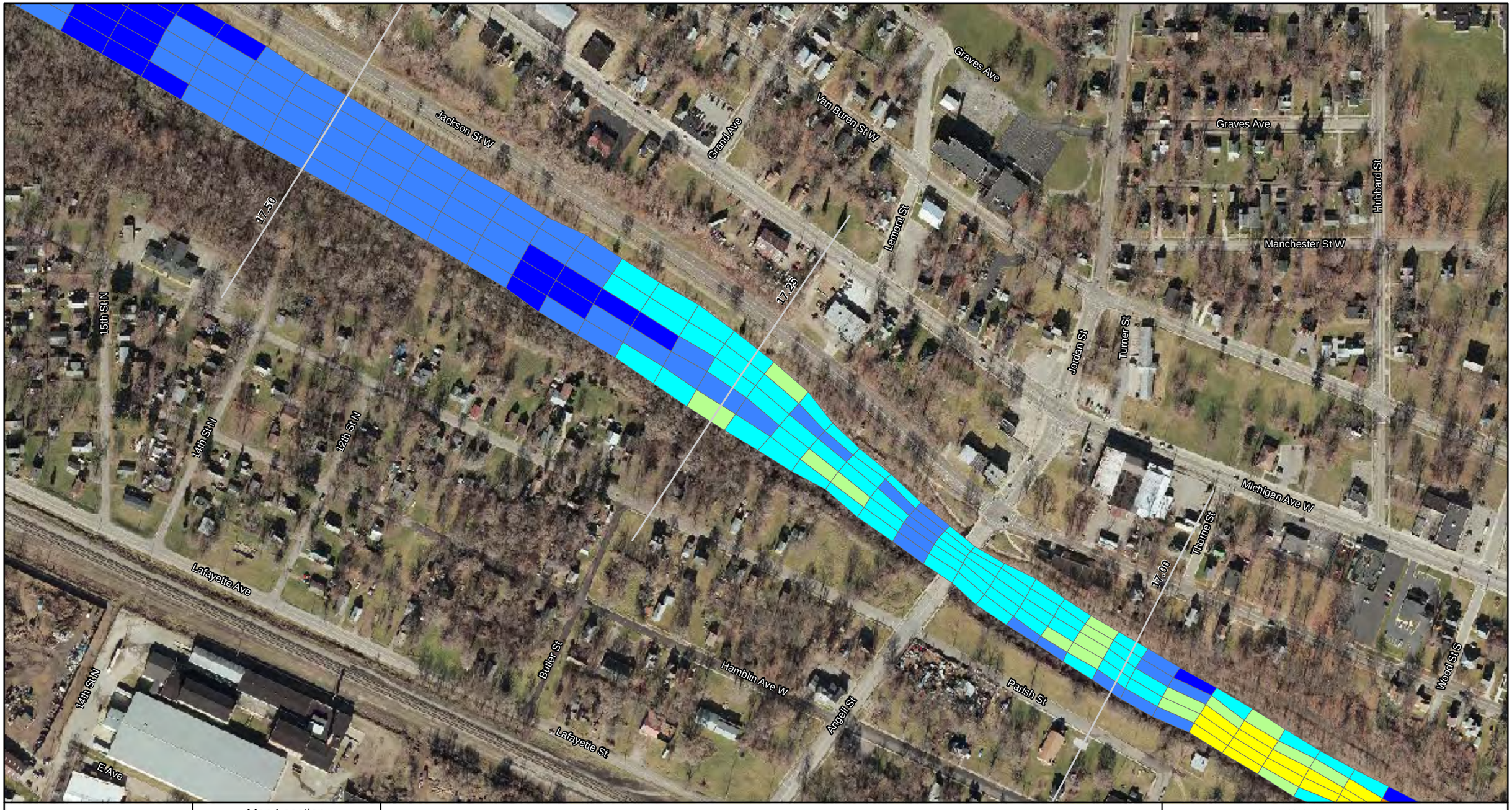
MP 16.30 - MP 16.95

SHEET 21 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep10_2010.mxd

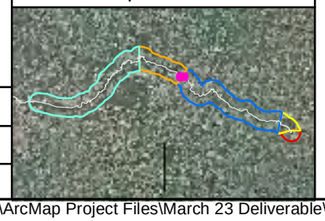
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

MP 16.85 - MP 17.60

SHEET 22 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep10_2010.mxd

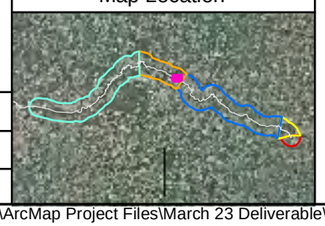
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

MP 17.60 - MP 18.40

SHEET 23 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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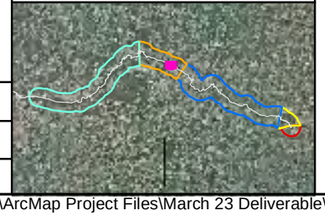
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

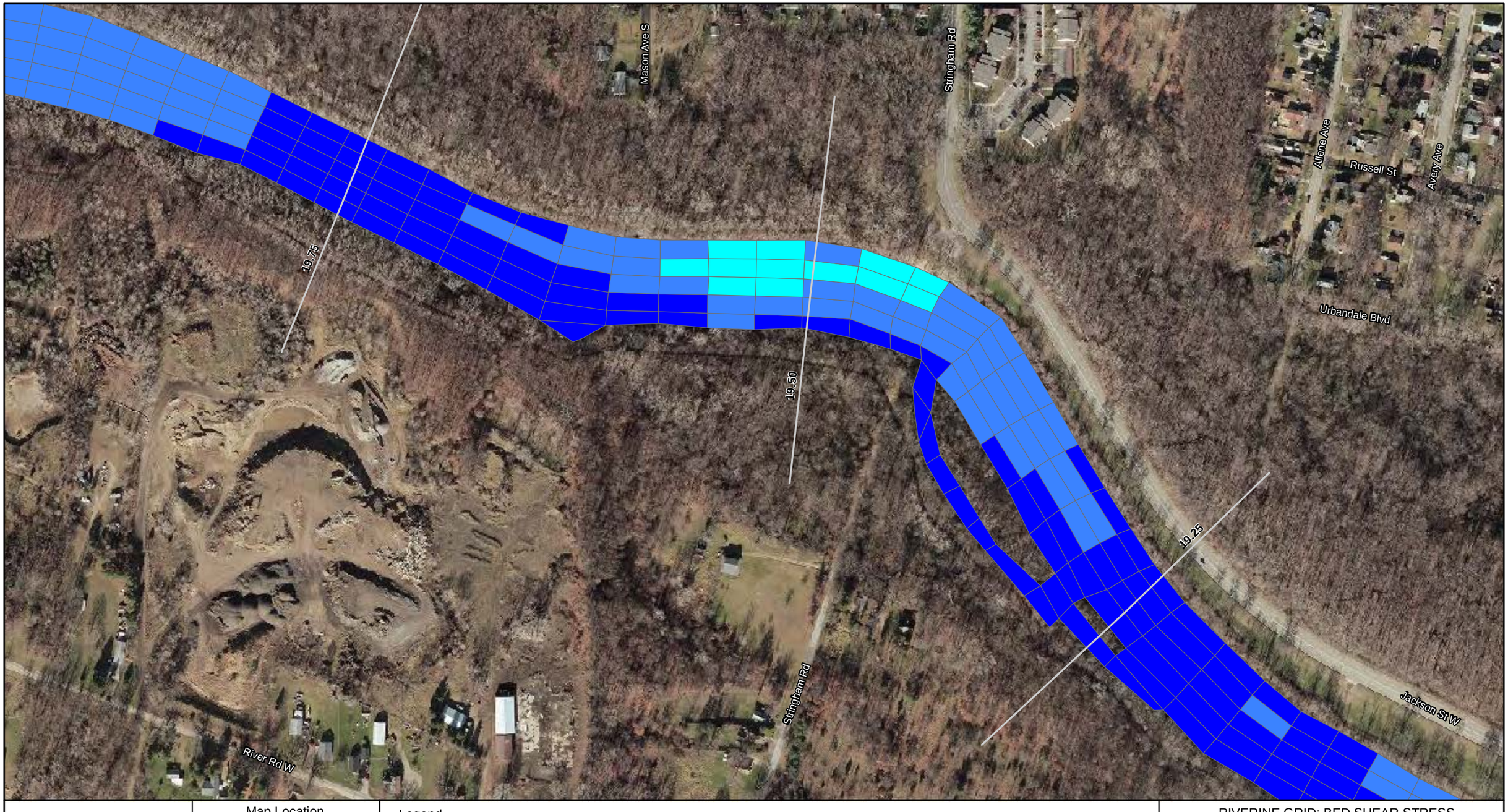
MP 18.30 - MP 19.15

SHEET 24 OF 56

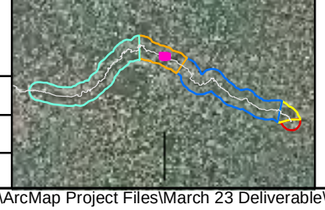
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep10_2010.mxd

Aerial Photography Date: November 2011



Map Location



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

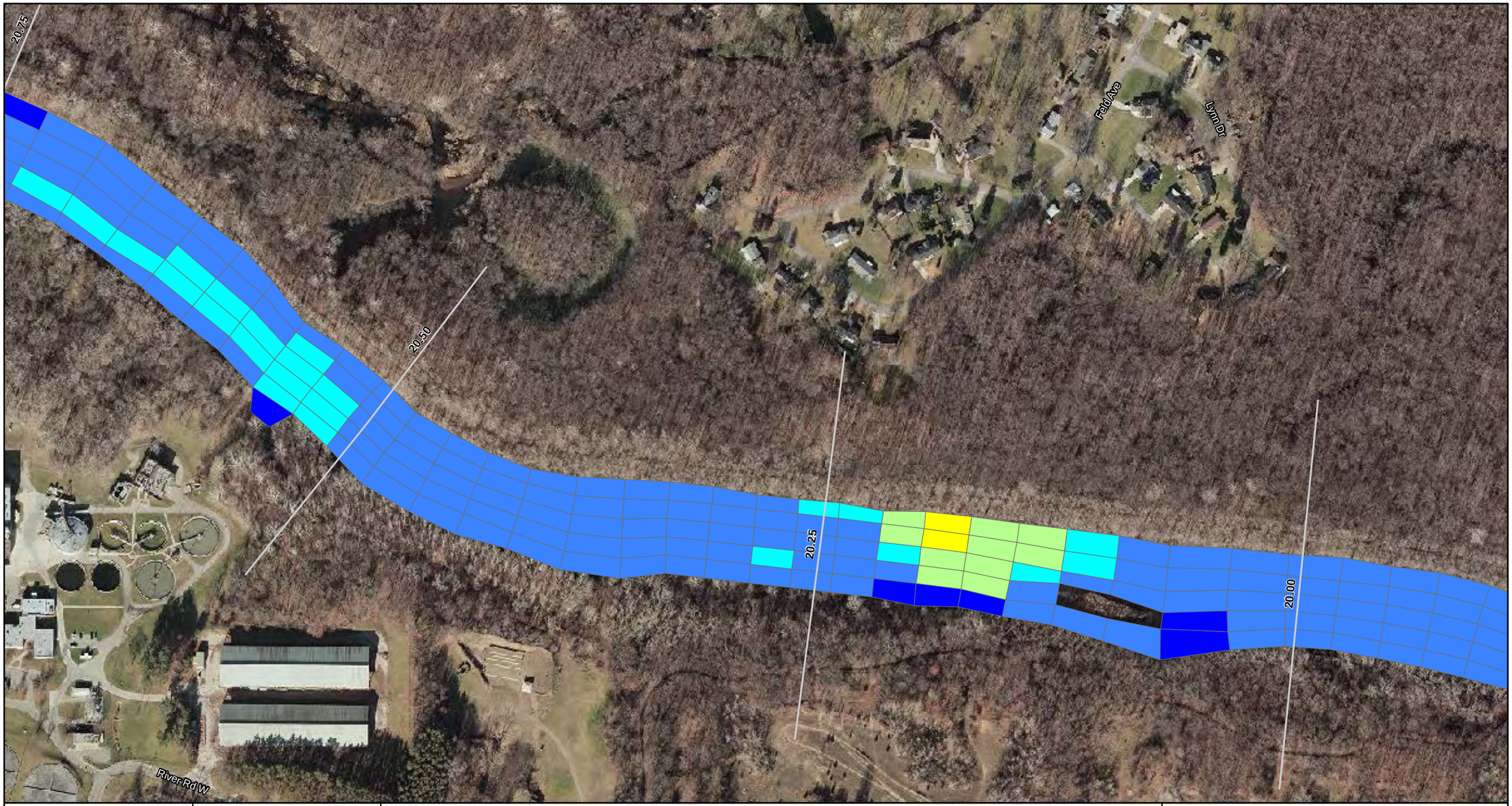
MP 19.10 - MP 19.95

SHEET 25 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep10_2010.mxd

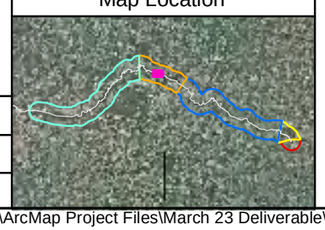
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

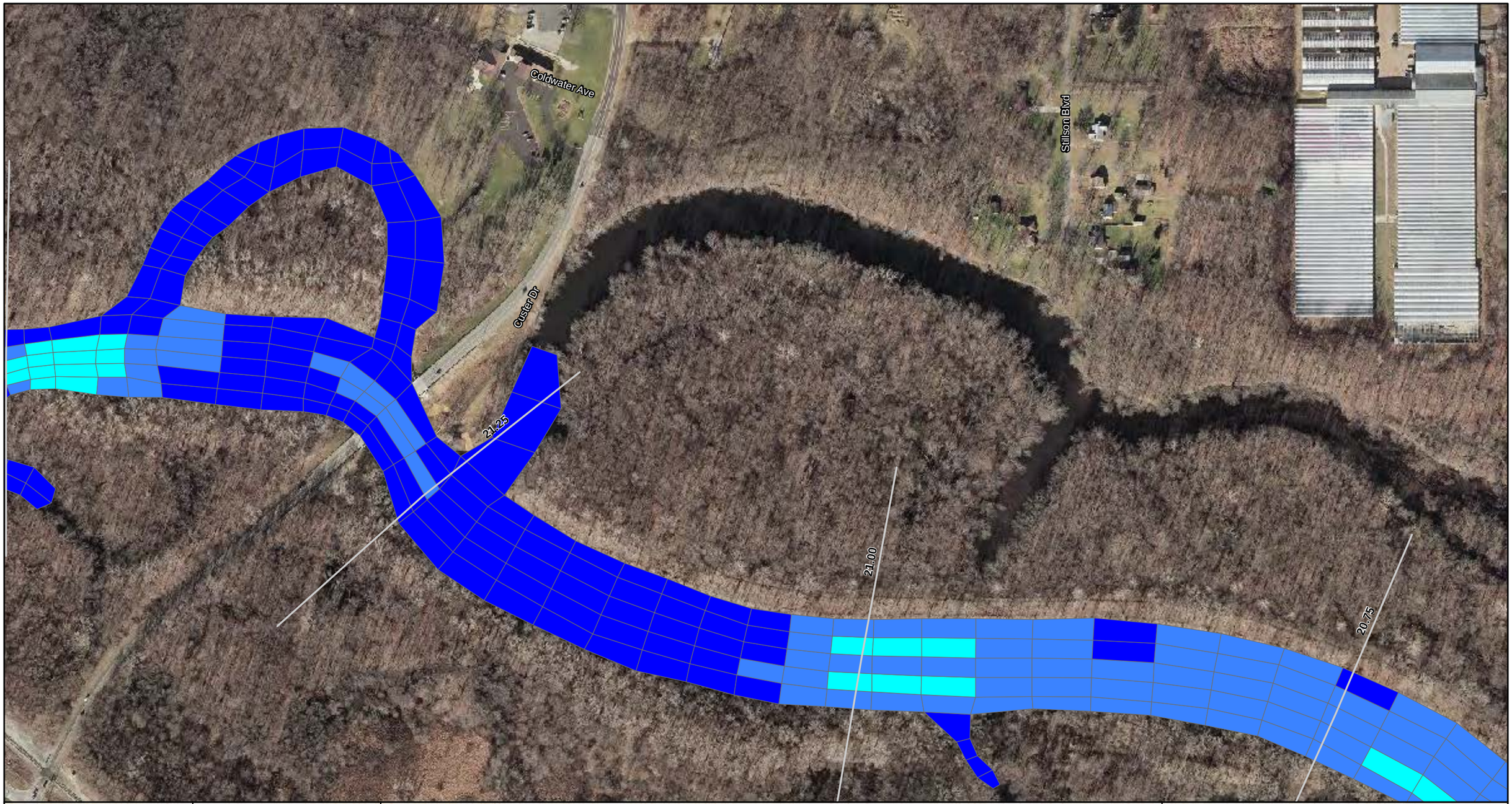
MP 19.90 - MP 20.75

SHEET 26 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

MP 20.70 - MP 21.50

SHEET 27 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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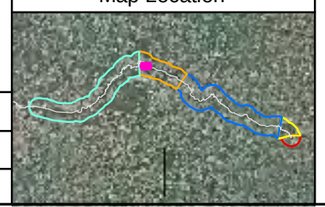
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

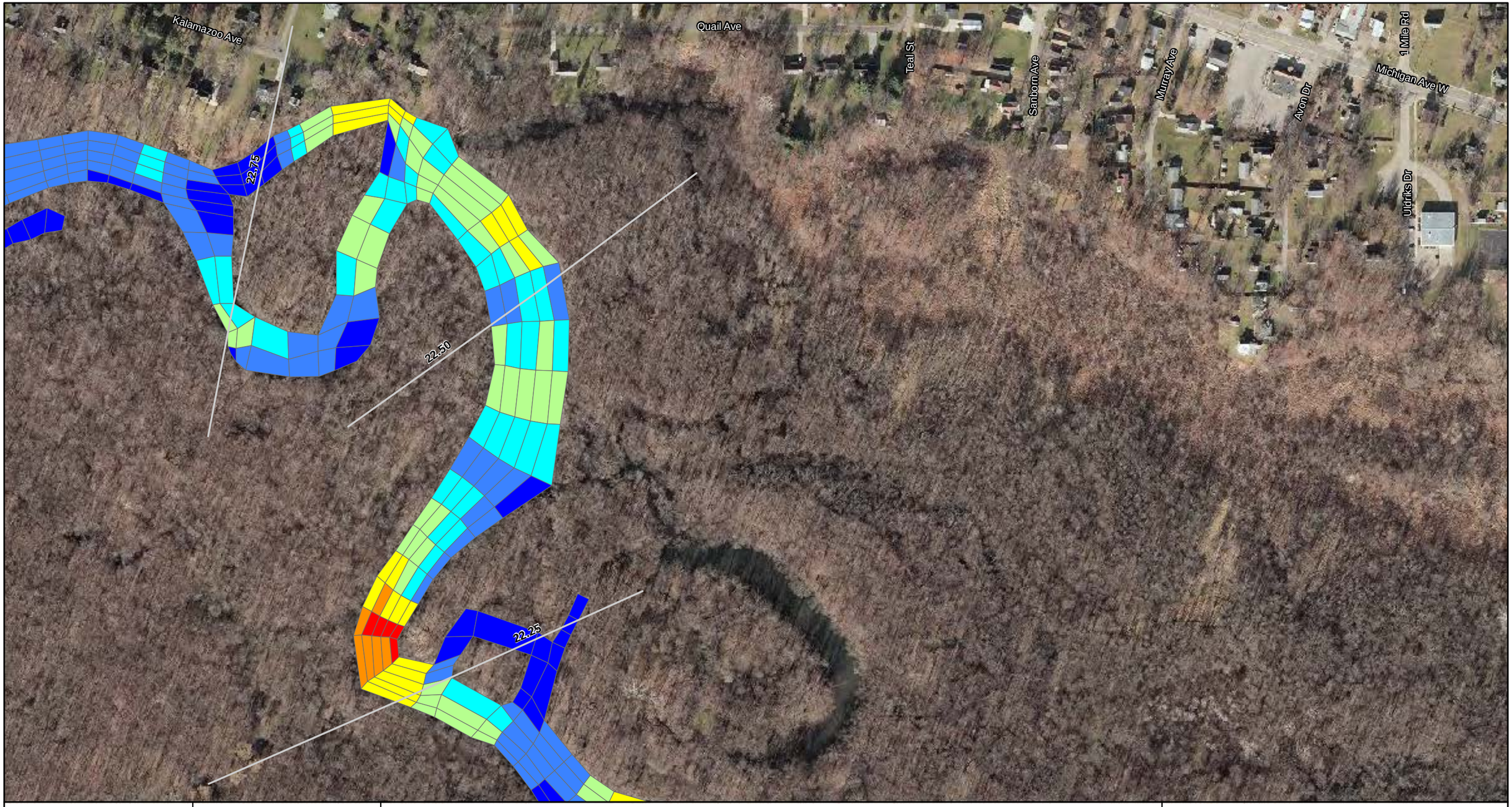
MP 21.35 - MP 22.15

SHEET 28 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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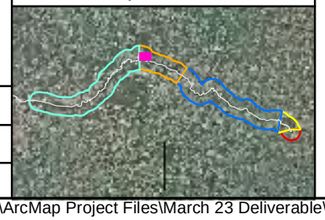
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

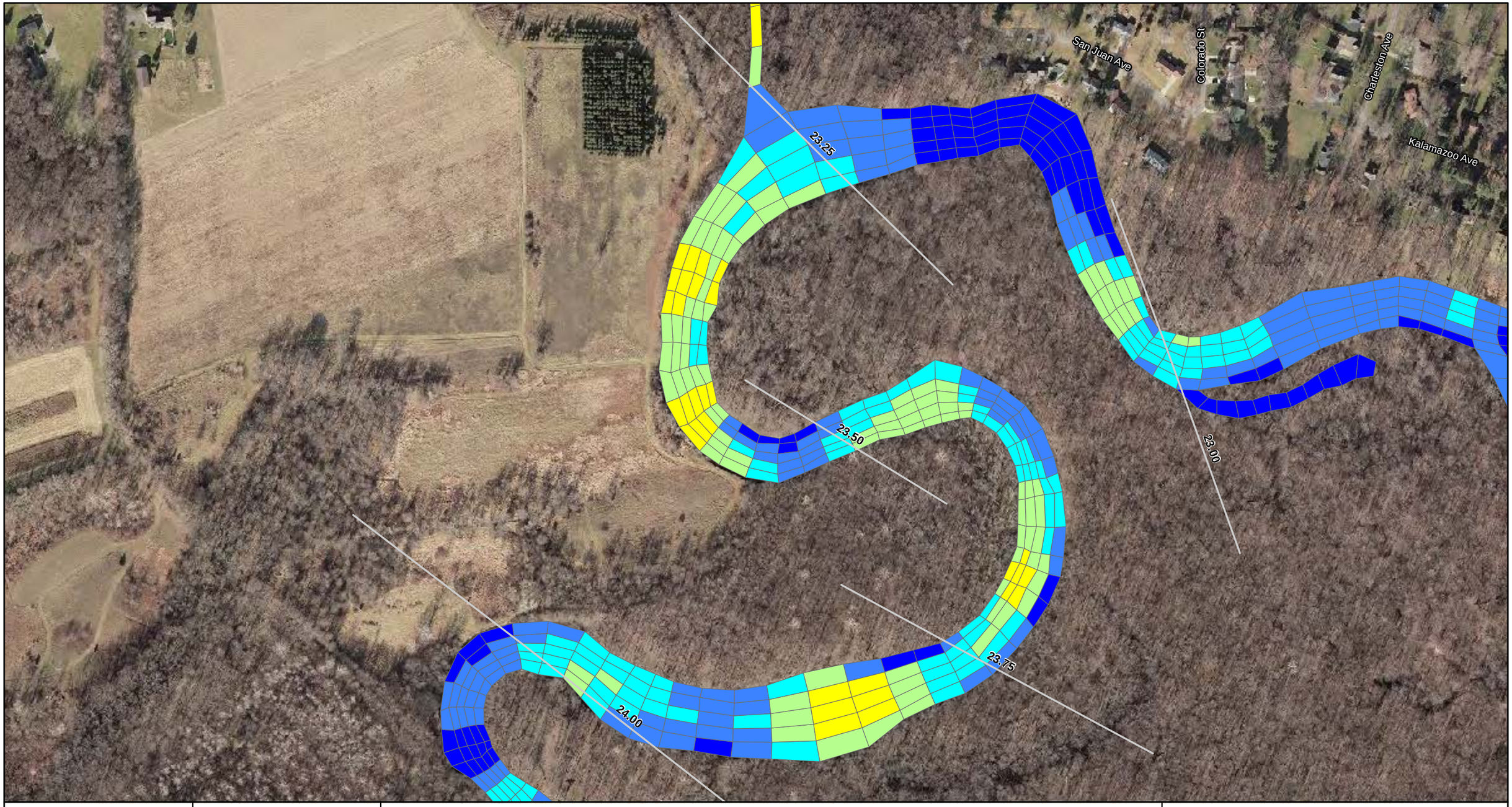
MP 22.15 - MP 22.90

SHEET 29 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep10_2010.mxd

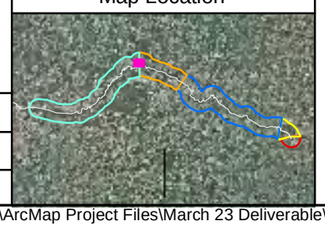
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

MP 22.80 - MP 24.10

SHEET 30 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

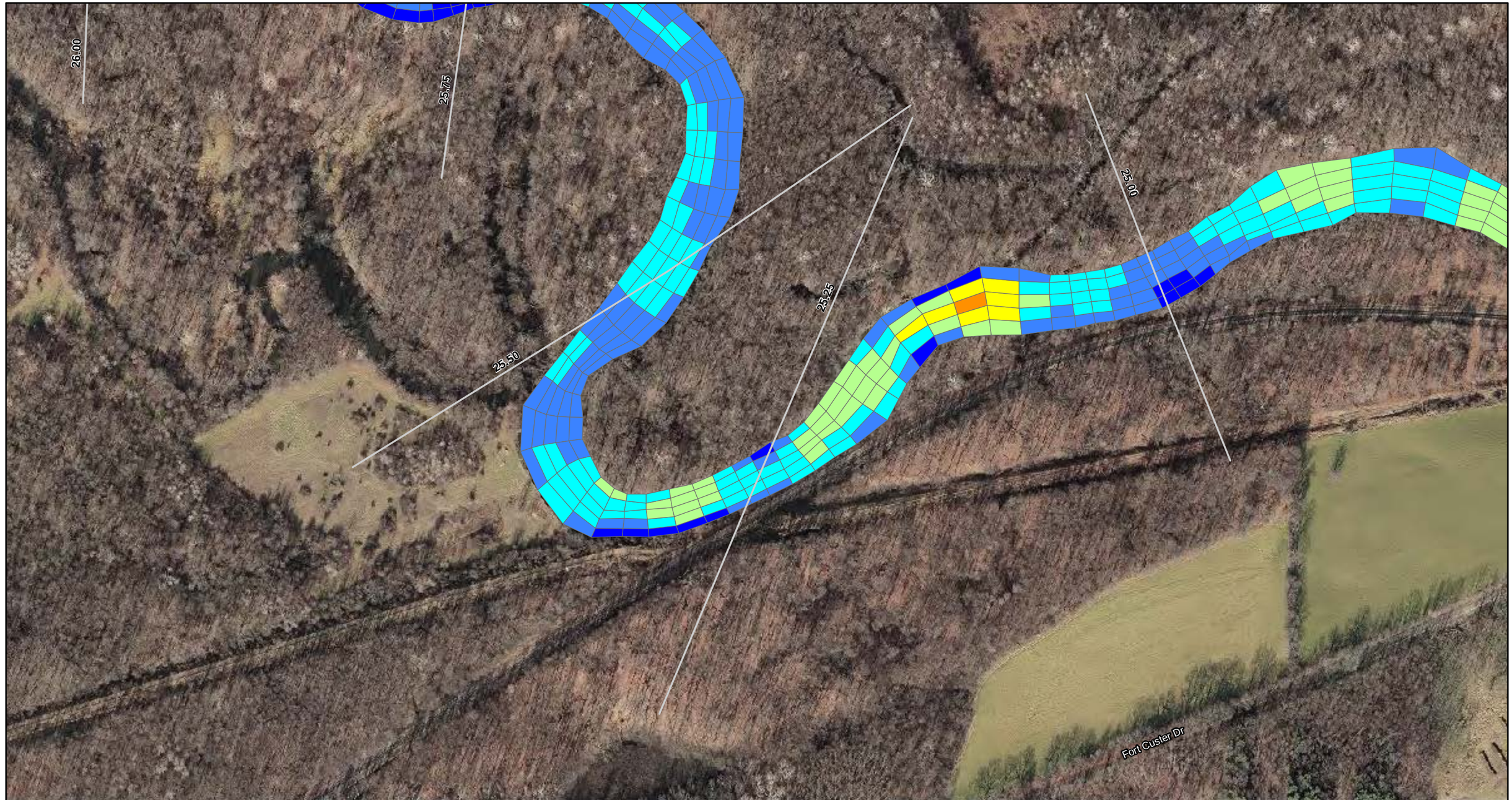
MP 24.10 - MP 24.85

SHEET 31 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep10_2010.mxd

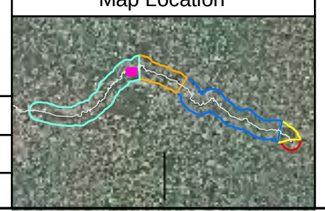
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

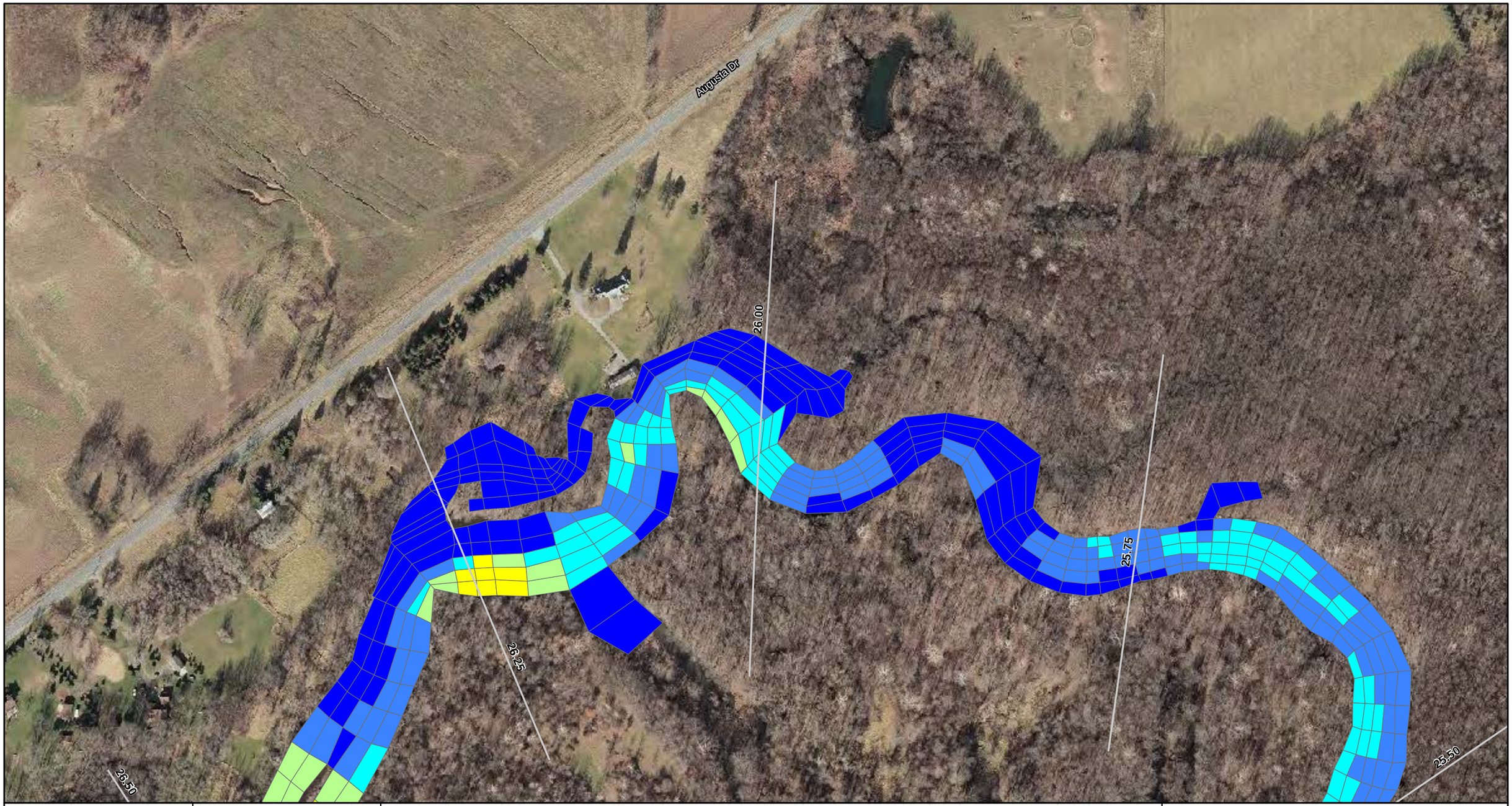
MP 24.80 - MP 25.65

SHEET 32 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

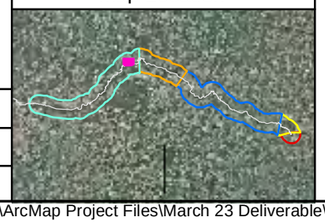
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep10_2010.mxd

Aerial Photography Date: November 2011



Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

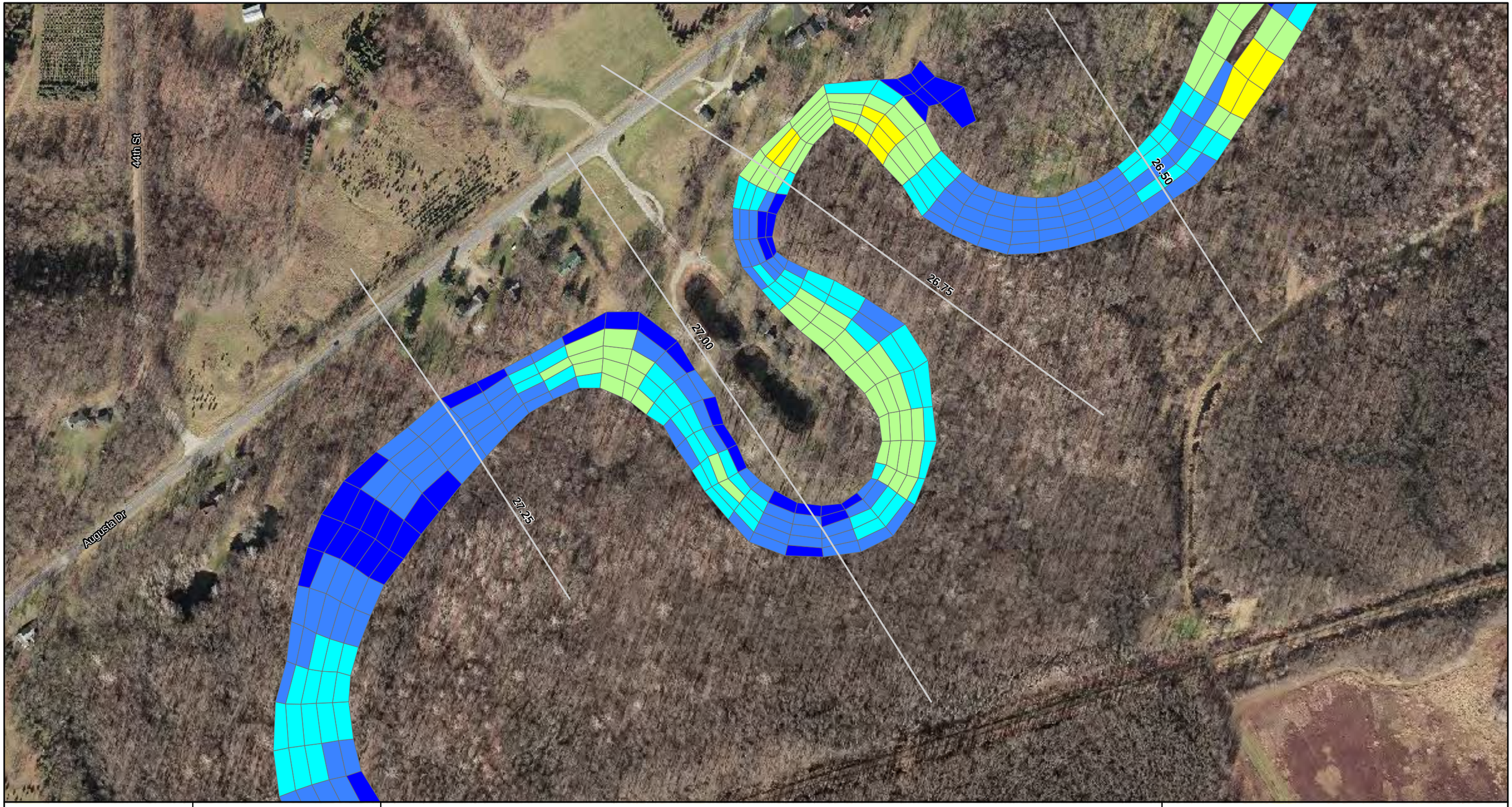
MP 25.55 - MP 26.40

SHEET 33 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep10_2010.mxd

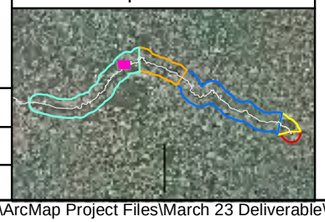
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
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- 5.000001 - 10.000000
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Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

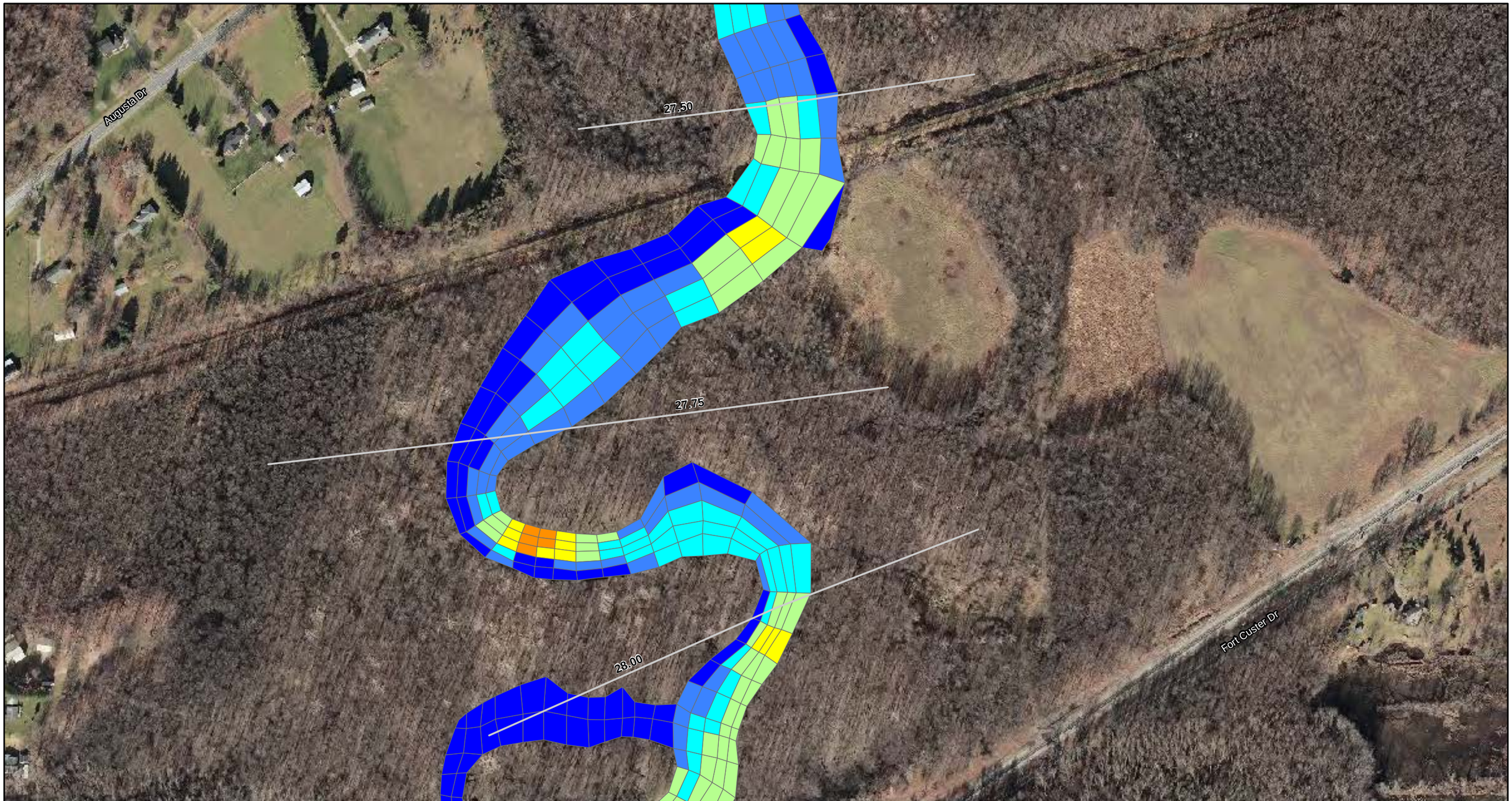
MP 26.40 - MP 27.45

SHEET 34 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
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- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
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Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

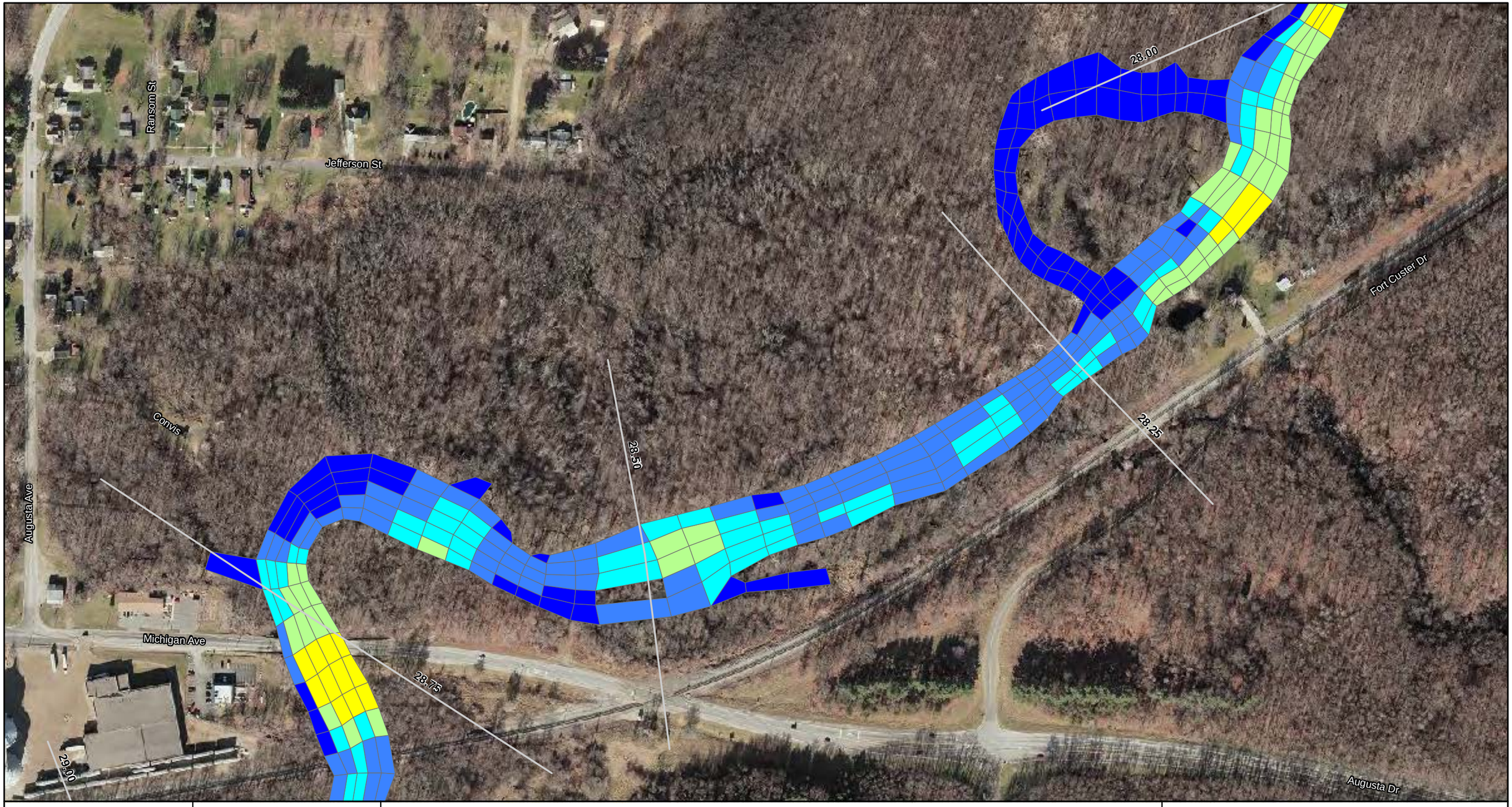
MP 27.45 - MP 28.10

SHEET 35 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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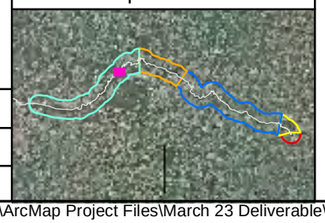
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
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- 10.000001 - 20.000000
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Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

MP 28.05 - MP 28.85

SHEET 36 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

Clinton St
Clinton St
Chestnut St
Webster St
Church St
Fayette St
Cass St
Cherry St
Lincoln St
28.75
29.00
29.25
29.50
Augusta Climax Rd
Fort Custer Rec Area Access

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
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- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

MP 28.85 - MP29.55

SHEET 37 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep10_2010.mxd

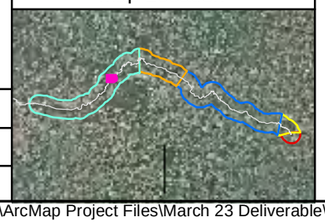
Aerial Photography Date: November 2011

29.50
29.75
30.00
30.25
Fort Custer Rec Area Service
Fort Custer Rec Area Access

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

MP 29.50 - MP29.95

SHEET 38 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep10_2010.mxd

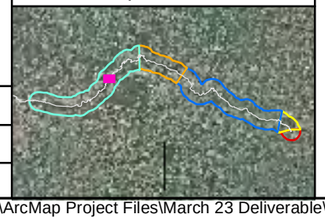
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

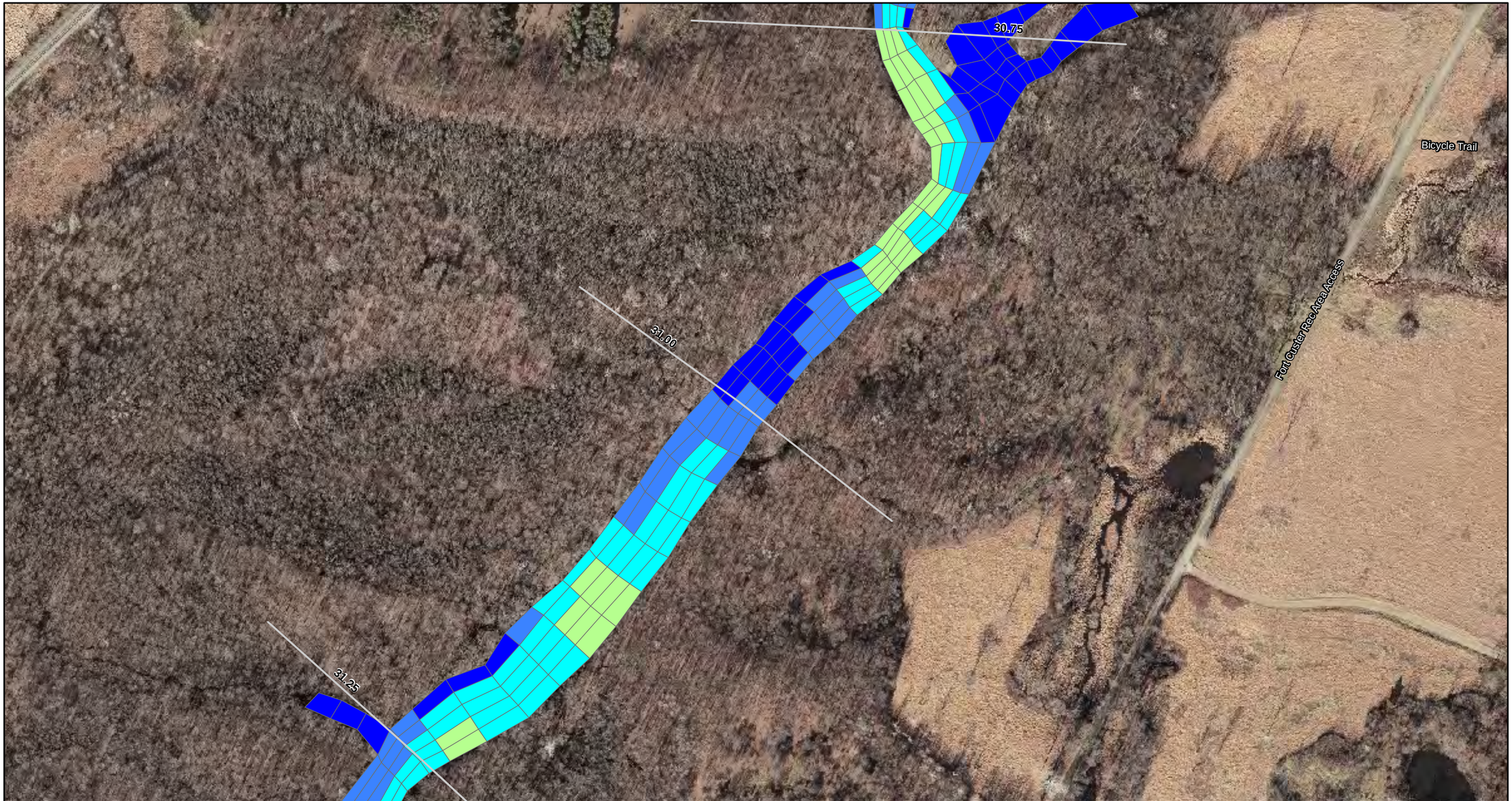
MP 29.95 - MP 30.80

SHEET 39 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

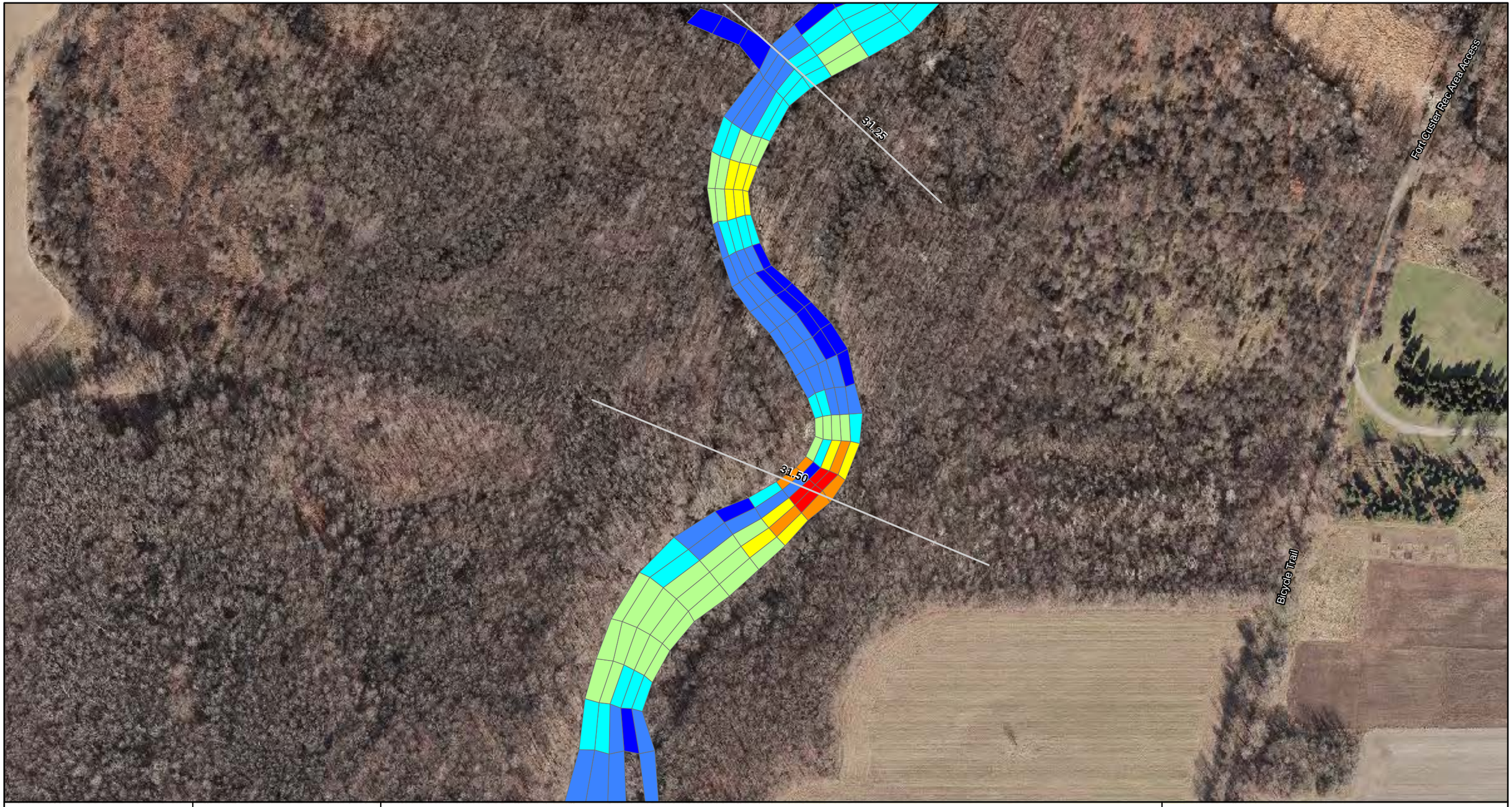
MP 30.75 - MP 31.25

SHEET 40 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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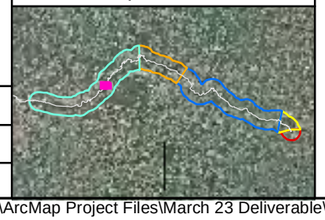
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

MP 31.25 - MP 31.70

SHEET 41 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

31.75

32.00

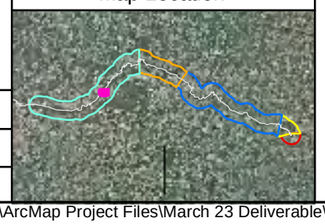
32.25

Bicycle Trail

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

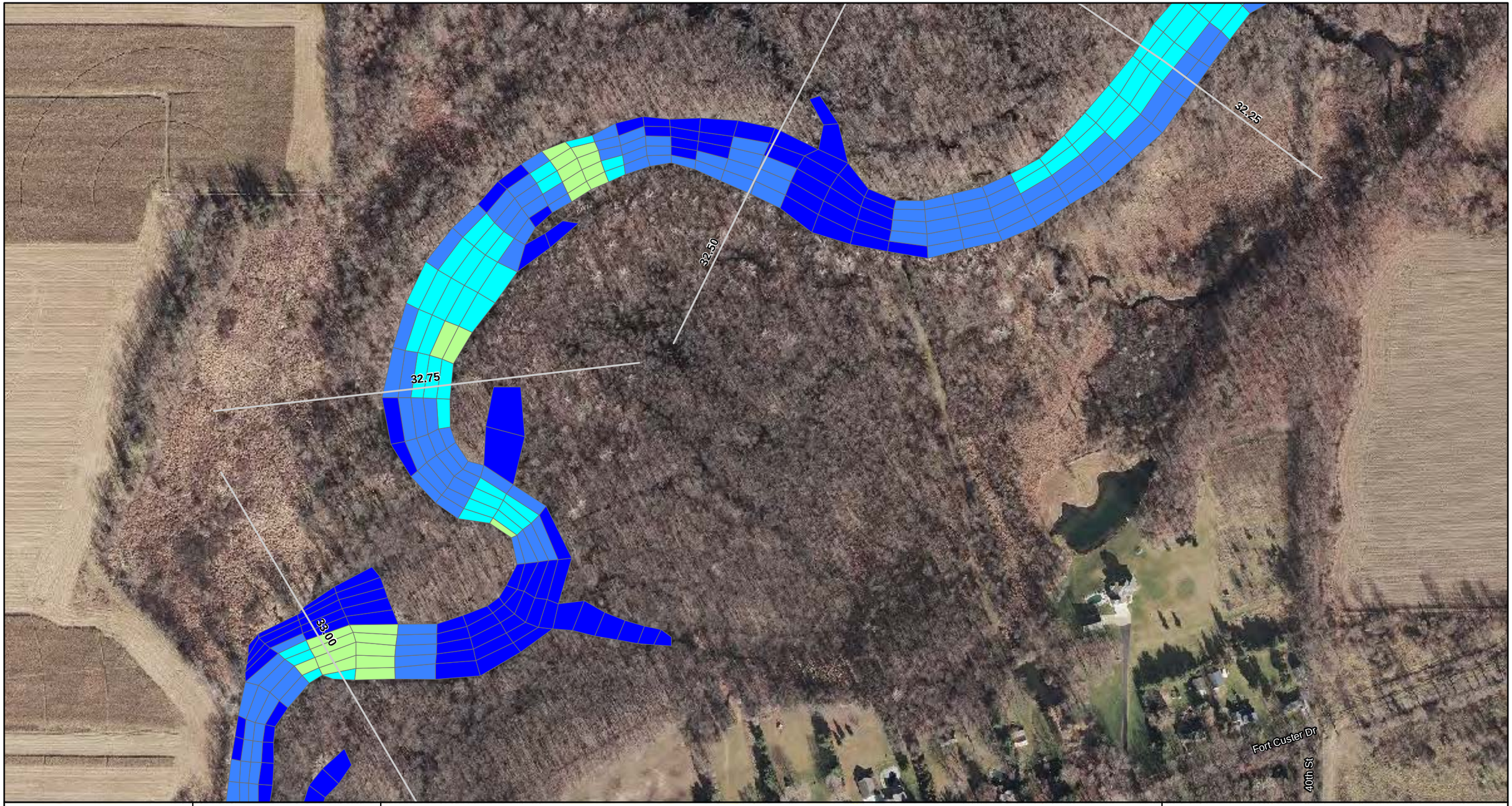
MP 31.65 - MP 32.25

SHEET 42 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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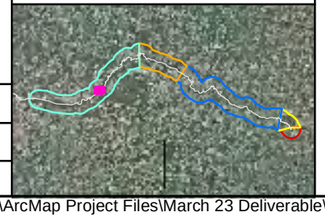
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

MP 32.25 - MP 33.10

SHEET 43 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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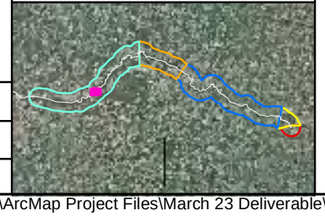
Aerial Photography Date: November 2011

33.00
33.25
33.50
33.75
Fort Custer Dr

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

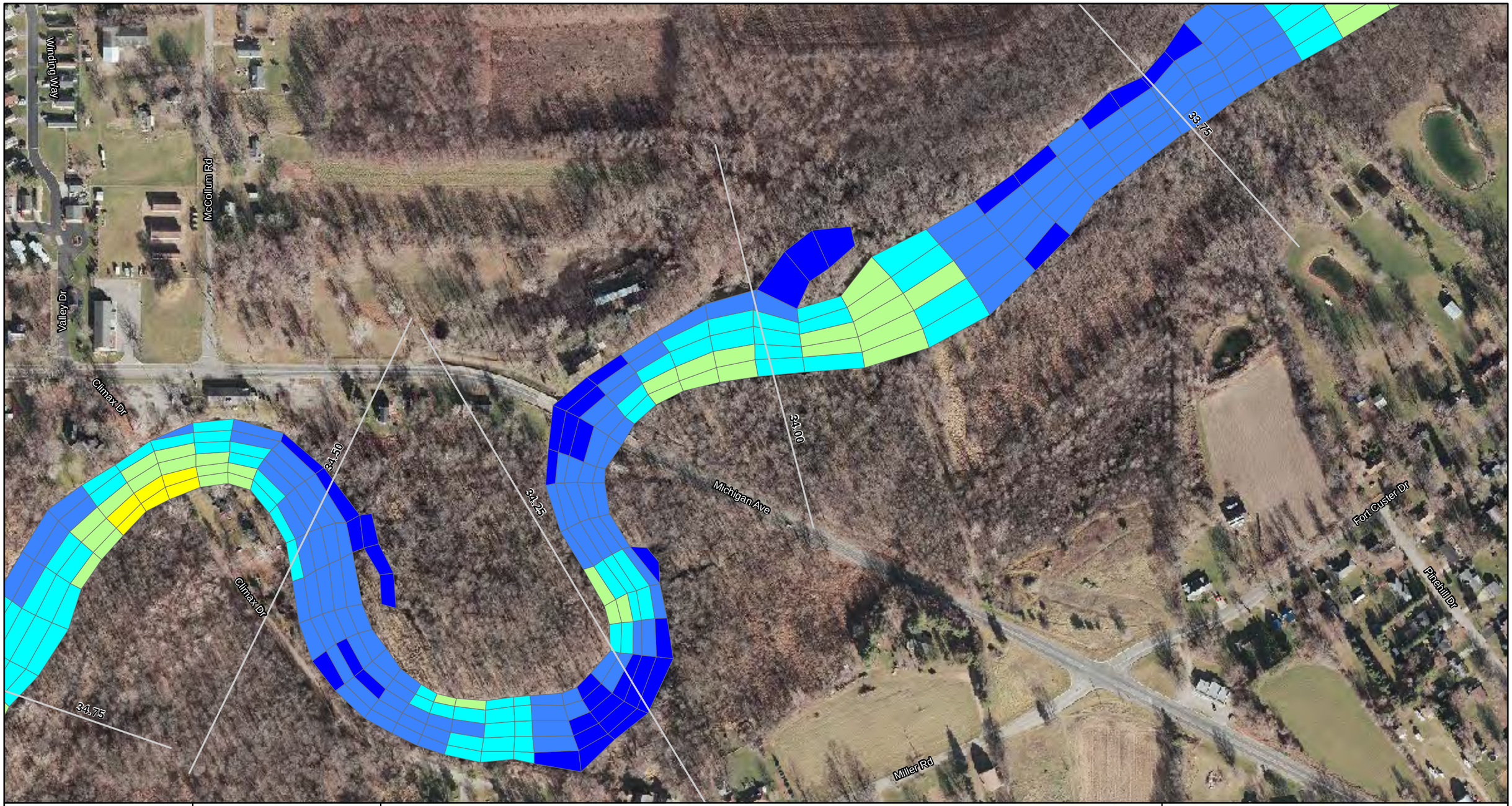
MP 33.10 - MP 33.70

SHEET 44 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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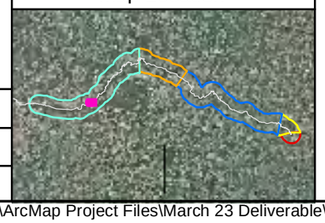
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

MP 33.70 - MP 34.70

SHEET 45 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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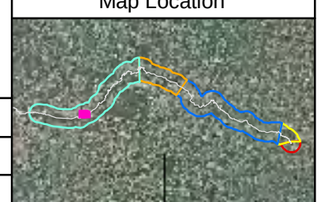
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

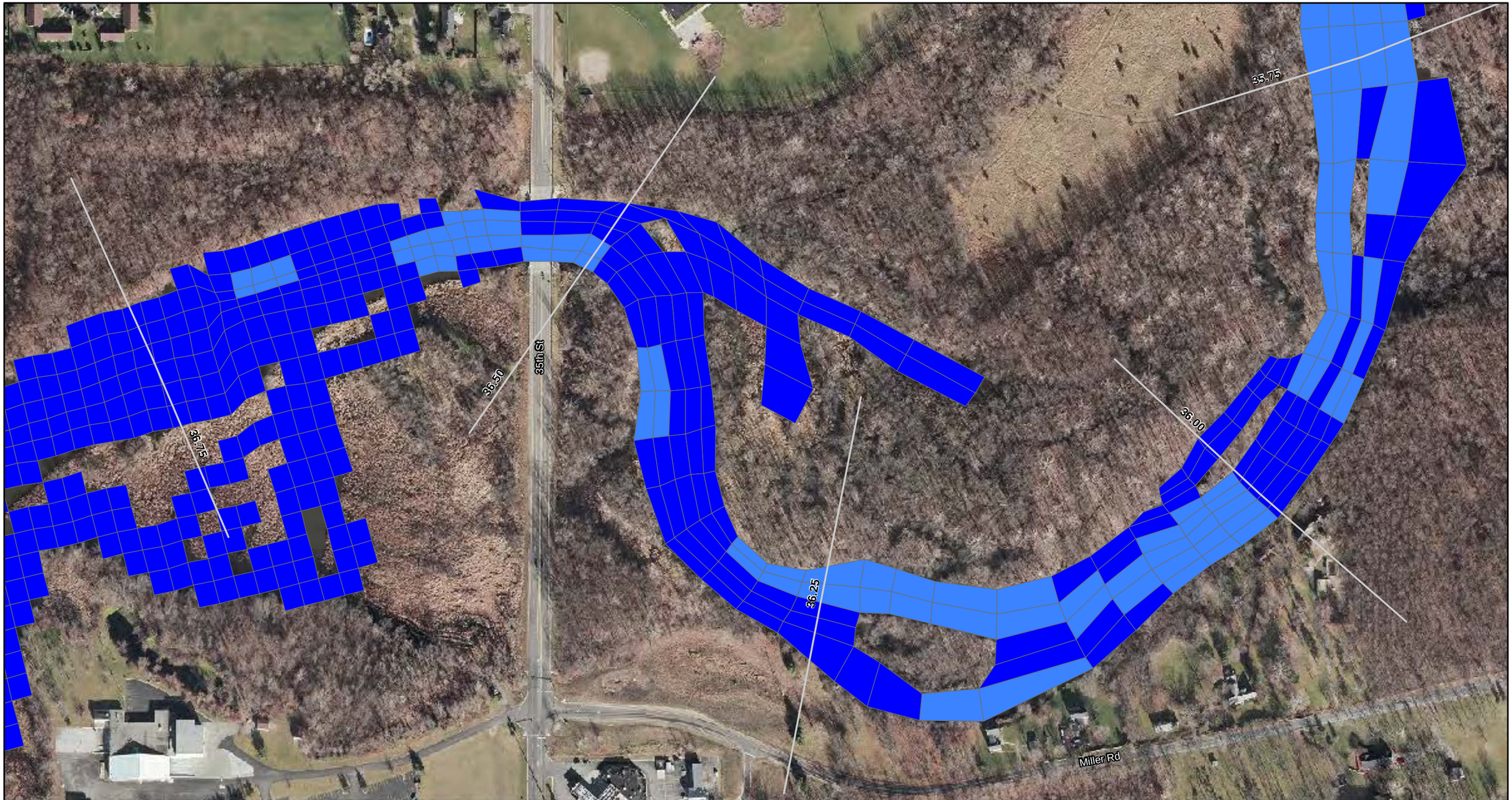
MP 34.70 - MP 35.75

SHEET 46 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

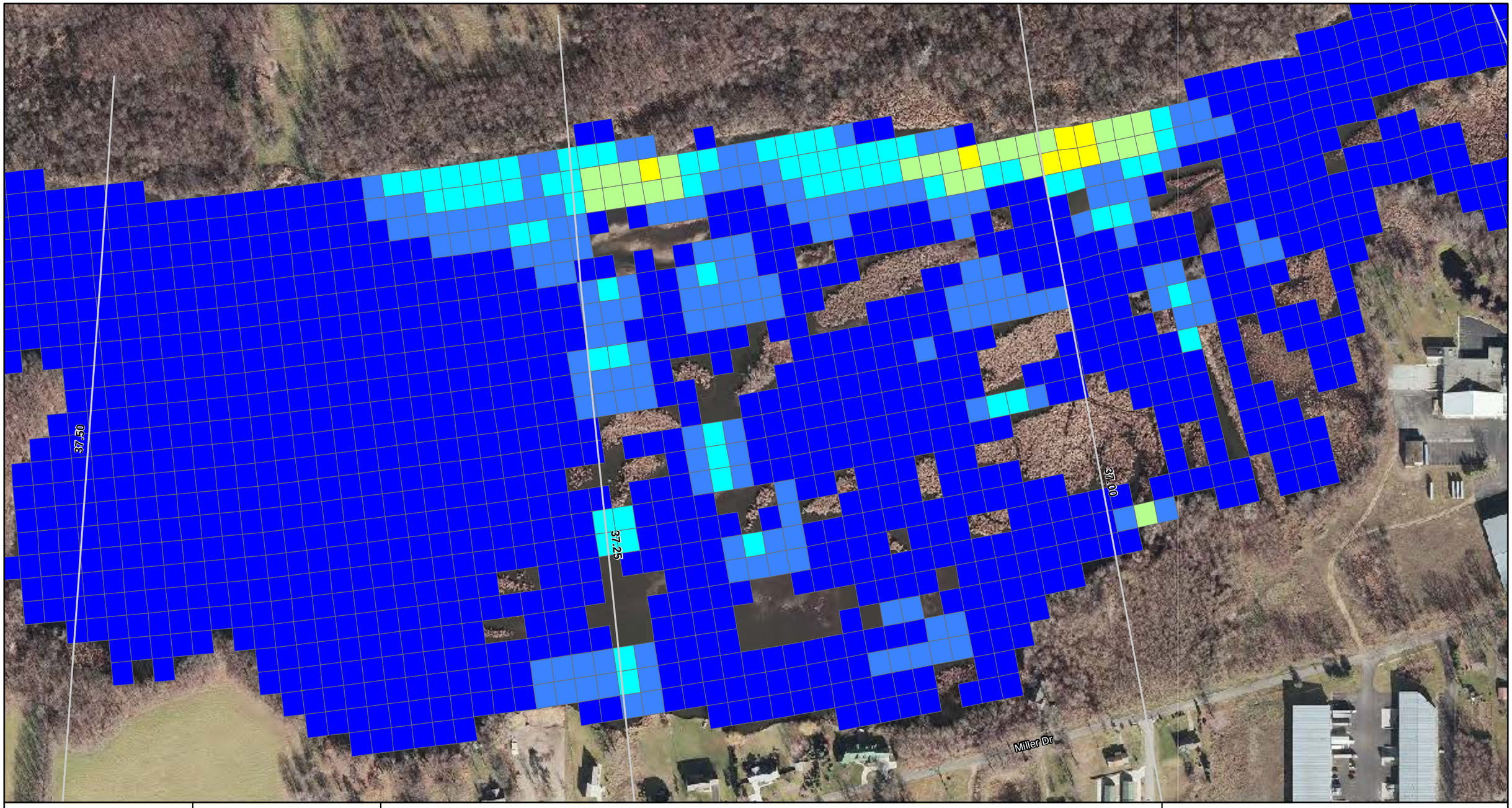
MP 35.75 - MP 36.80

SHEET 47 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

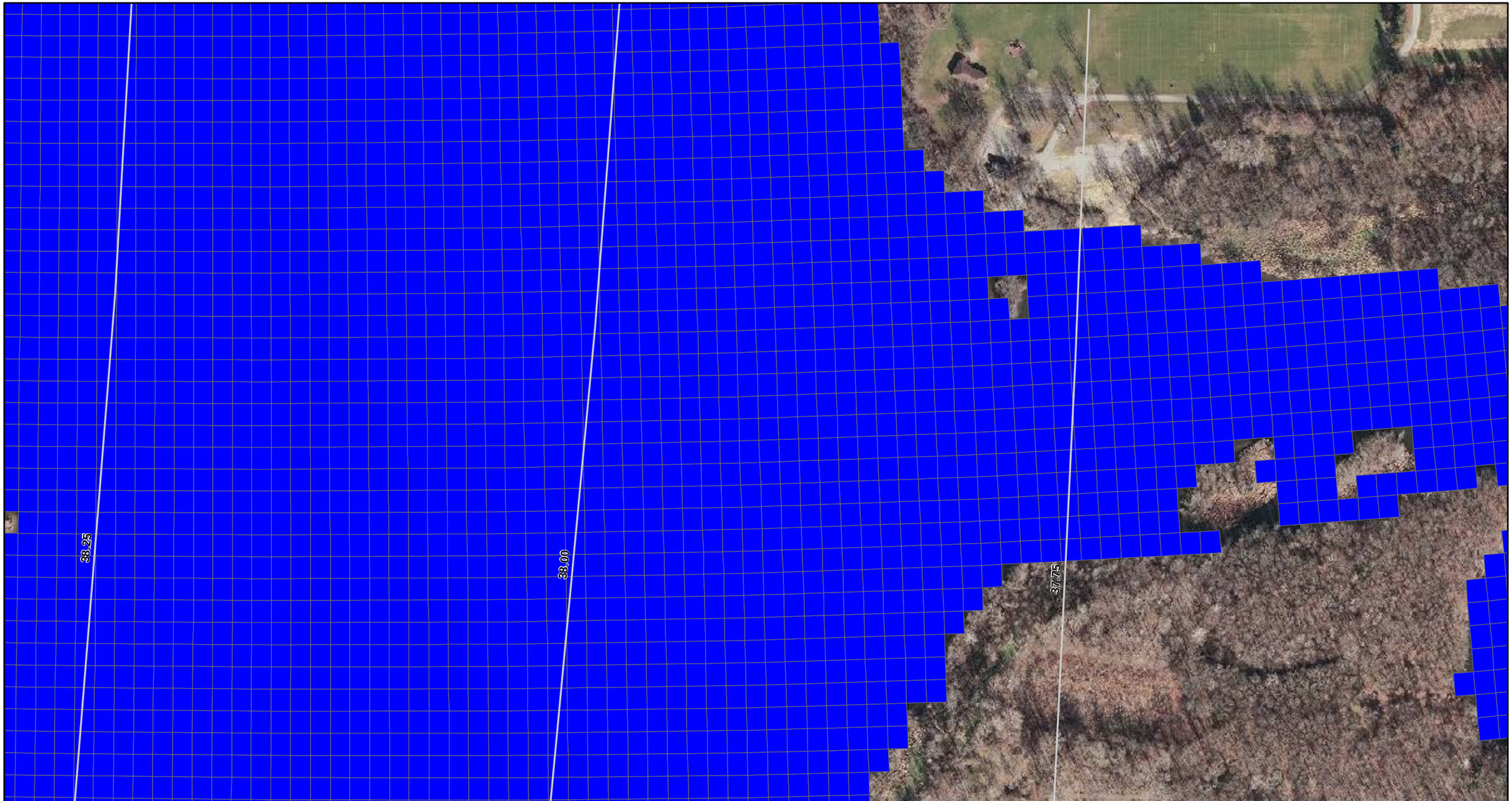
MP 36.80 - MP 37.55

SHEET 48 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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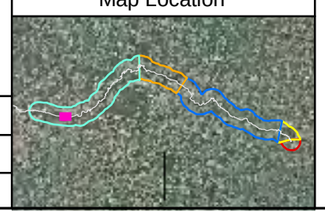
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

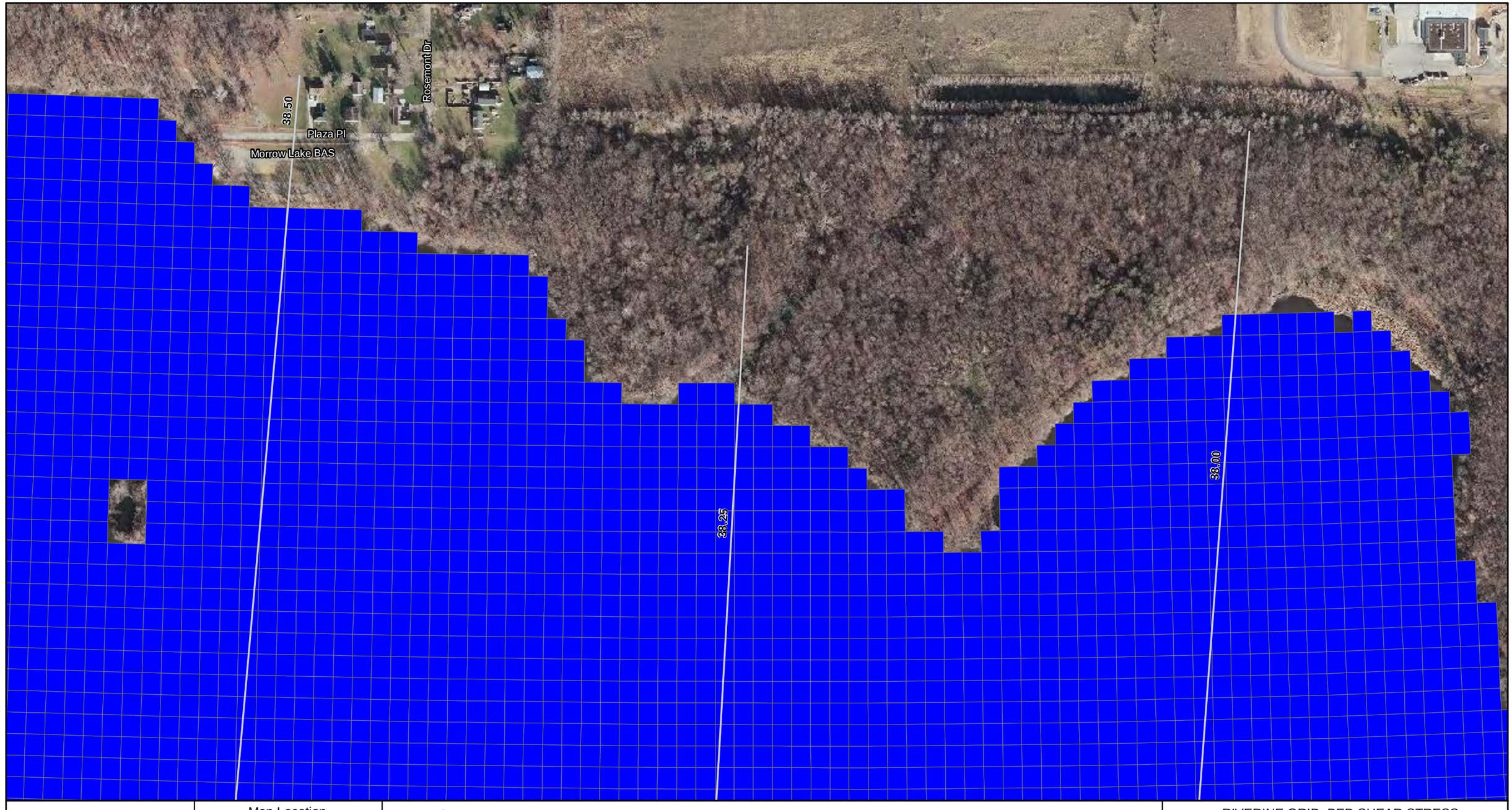
MP 37.55 - MP 38.30

SHEET 49 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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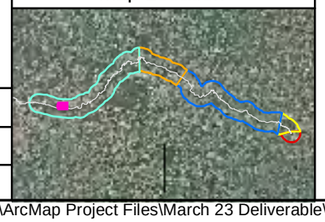
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

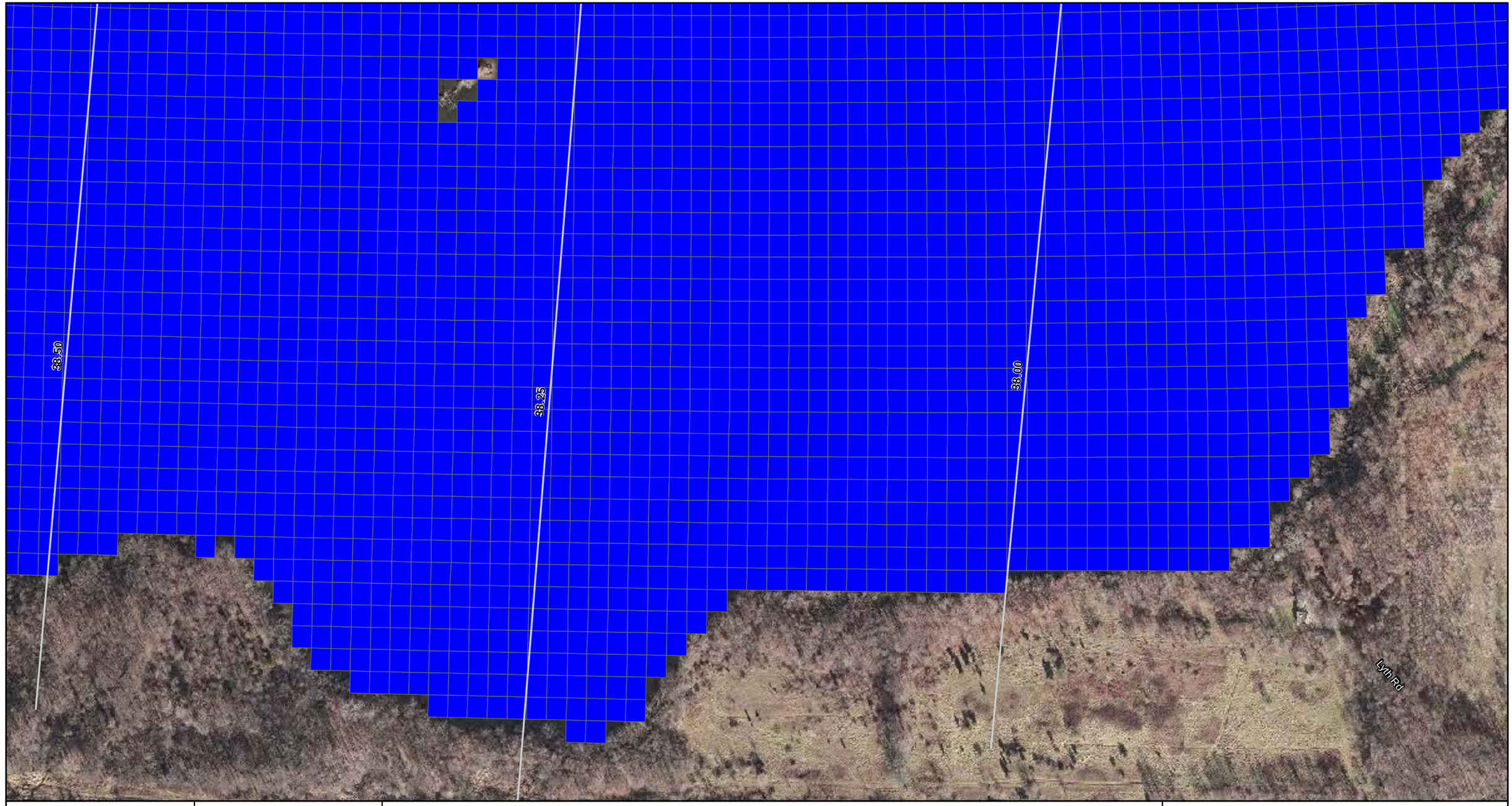
MP 37.80 - MP 38.60N

SHEET 50 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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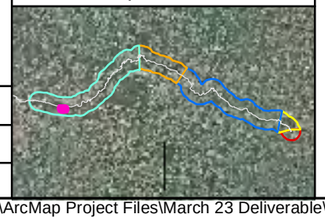
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

MP 37.80 - MP 38.60S

SHEET 51 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

39.00

38.75

38.50

38.25

ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500

Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

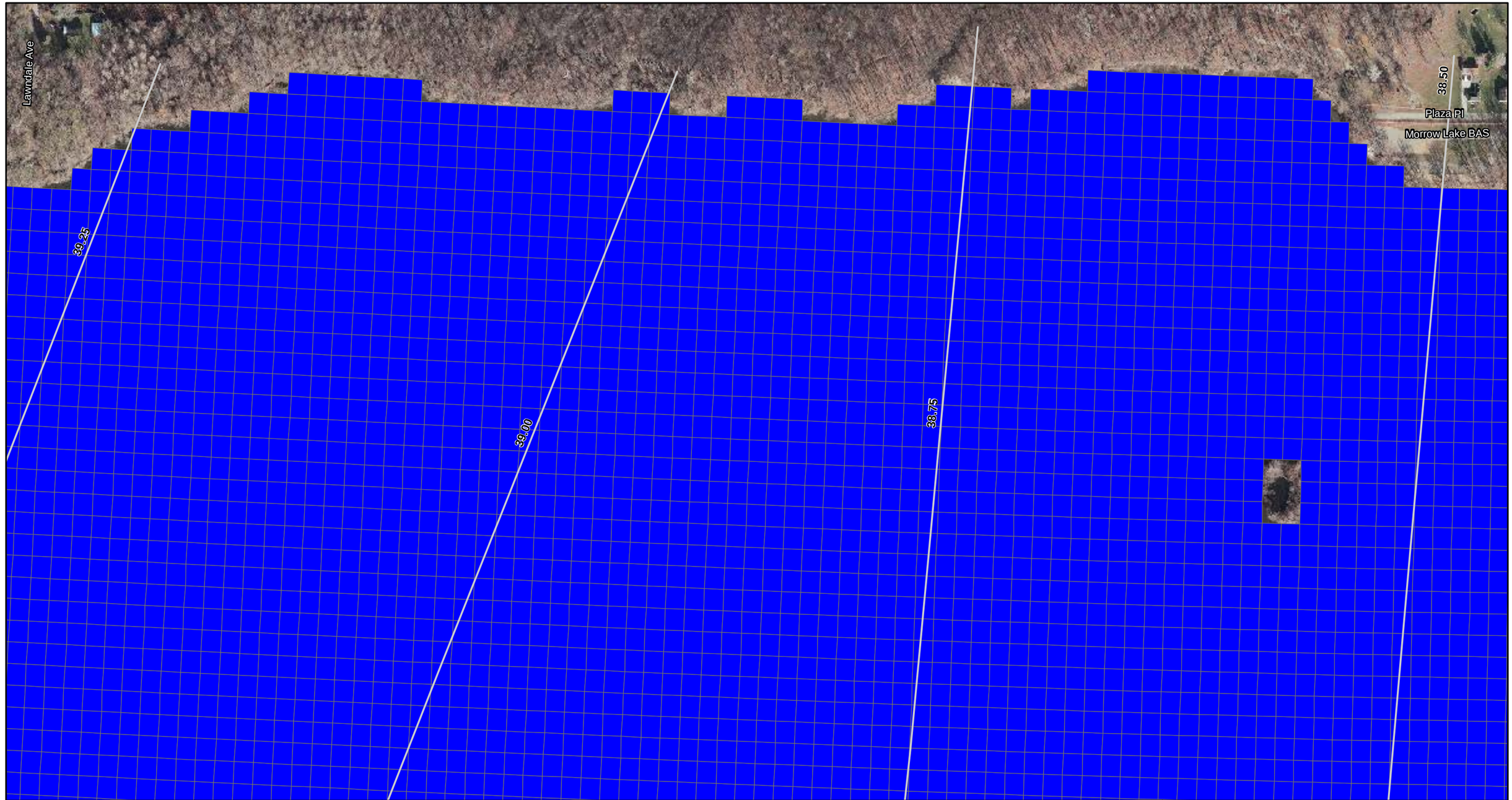
MP 38.25 - MP 39.00C

SHEET 52 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

N

0 125 250 500
Scale in Feet

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

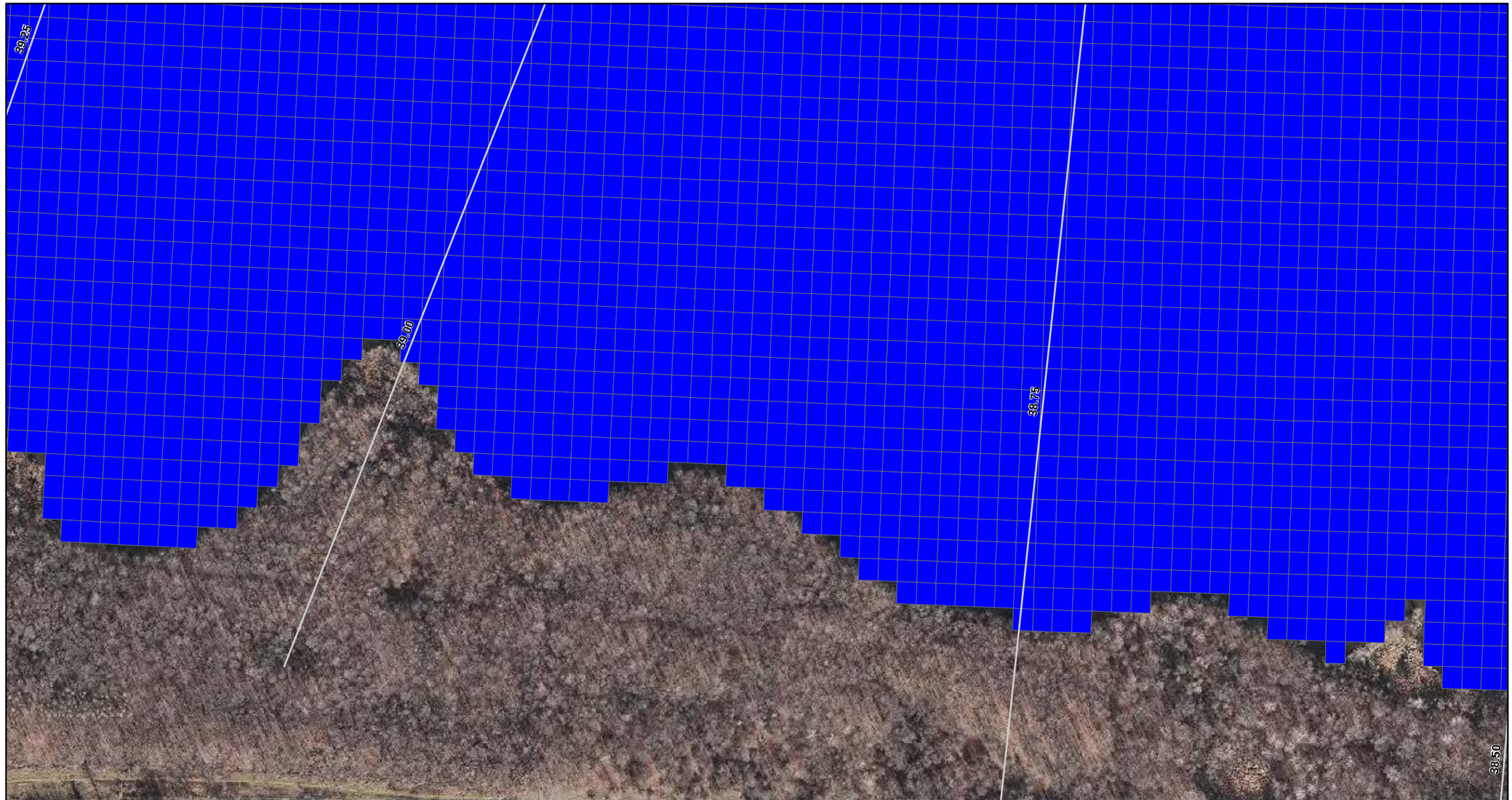
MP 38.50 - MP 39.25N

SHEET 53 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep10_2010.mxd

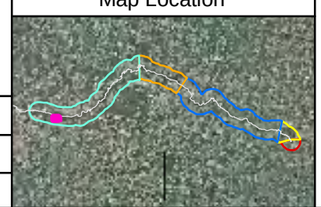
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

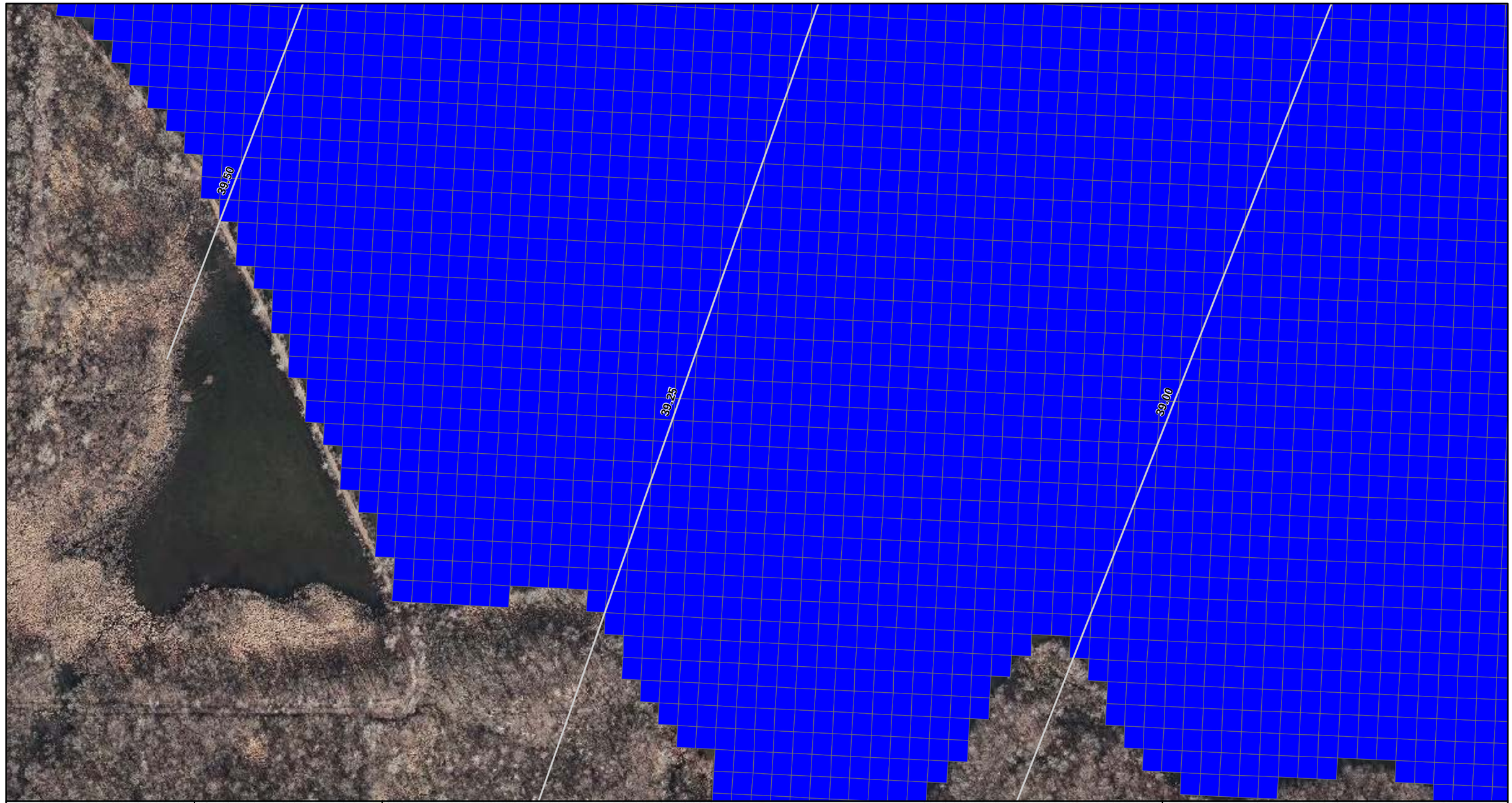
MP 38.50 - MP 39.25S

SHEET 54 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep10_2010.mxd

Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010
- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

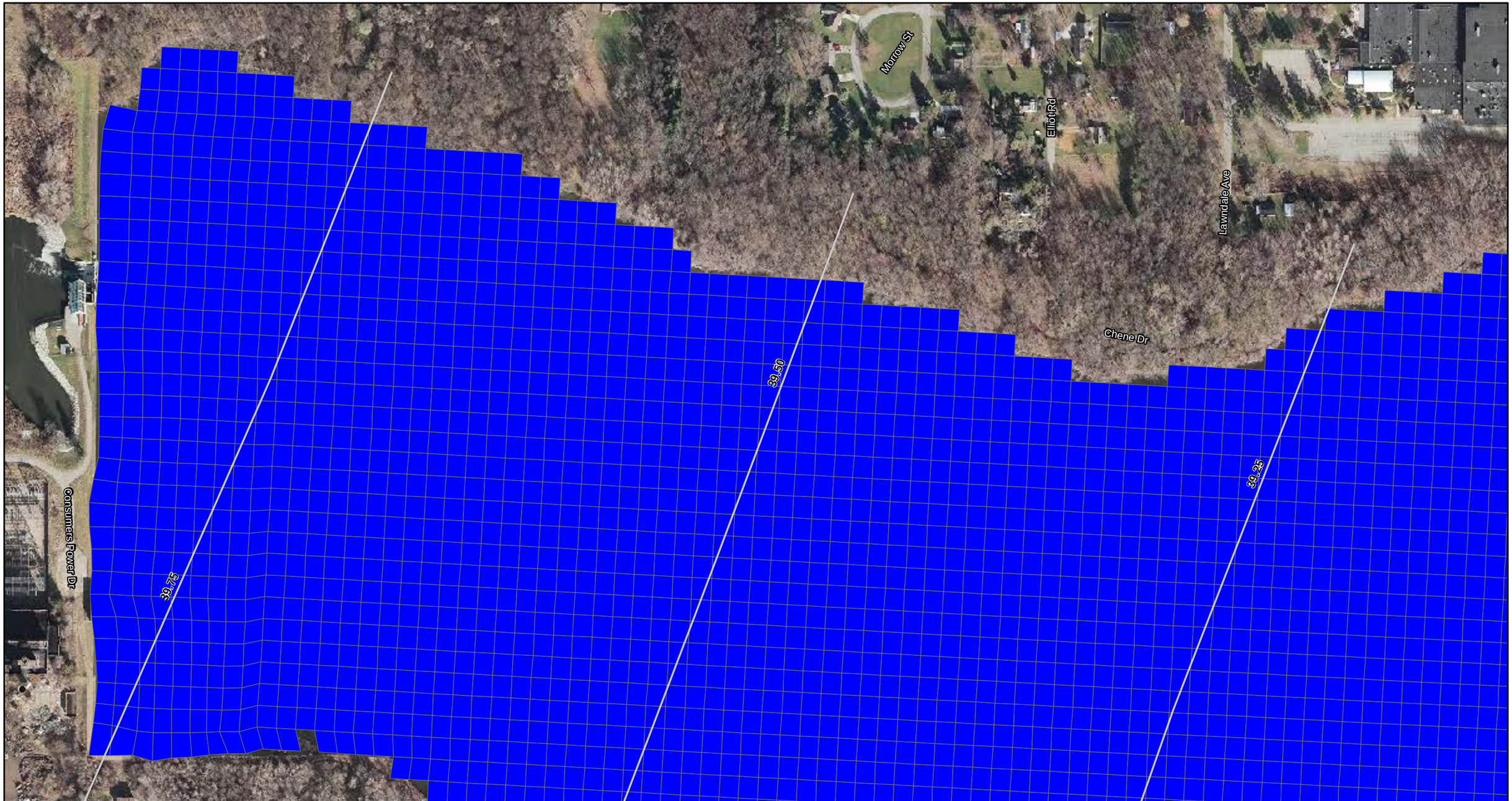
MP 38.90 - MP 39.60S

SHEET 55 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Bed_Shear_Stress_Sep10_2010.mxd

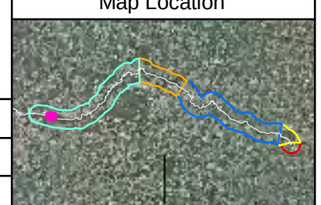
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	3/22/2012
Approved:	DBR	3/22/2012
Project #:	106-4186	

Map Location



Legend

Bed Shear Stress (Pa), September 10, 2010

- < 1.000001
- 1.000001 - 2.000000
- 2.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 20.000000
- > 20.000000

Quarter Mile Grid Segment

Pa = Pascals
cfs = Cubic Feet Per Second

Kalamazoo River near Battle Creek USGS gage daily average discharge: 455 cfs

N

0 125 250 500
Scale in Feet

RIVERINE GRID: BED SHEAR STRESS
SEPTEMBER 10, 2010

MP 39.15 - MP 39.85

SHEET 56 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

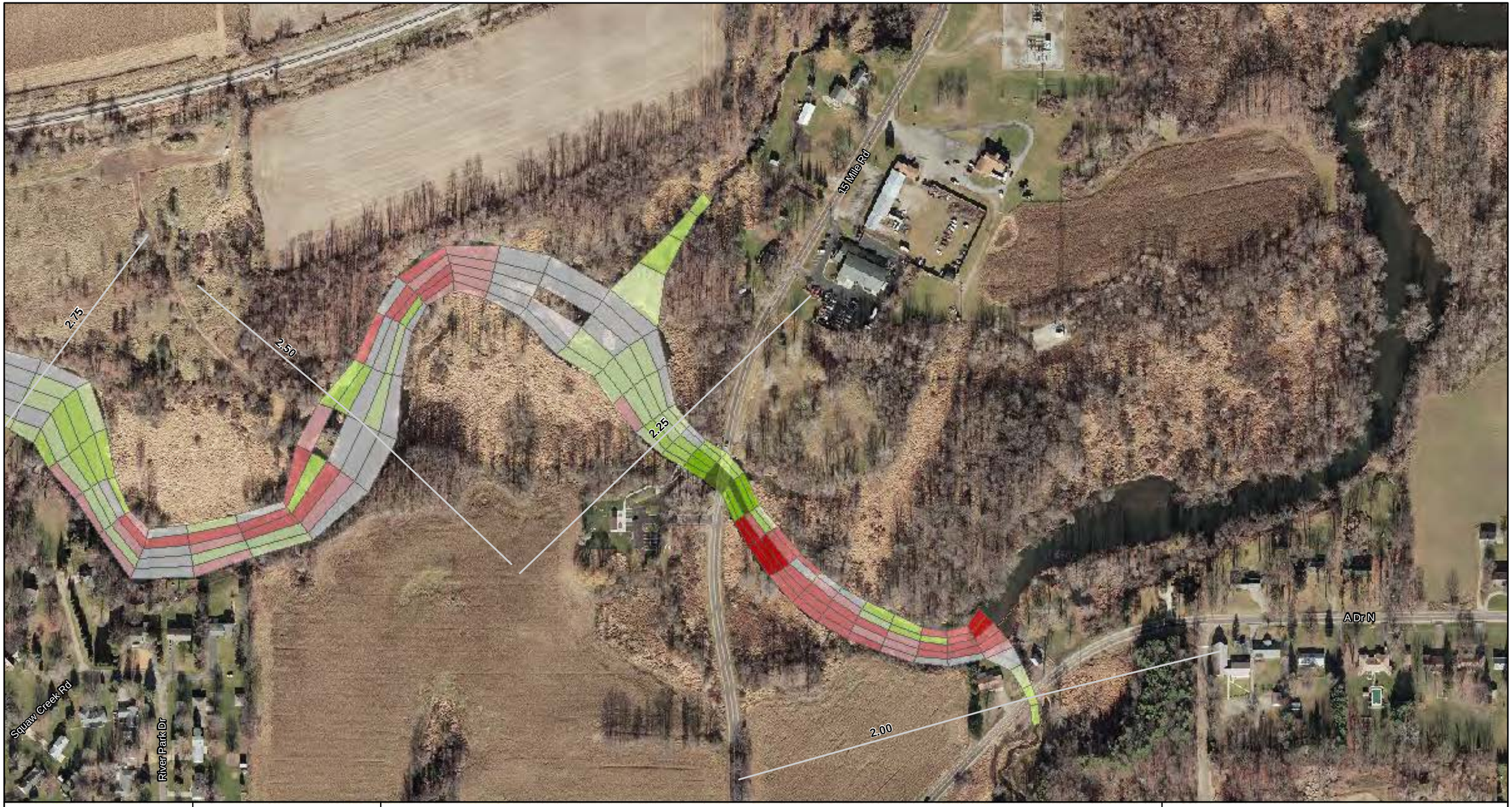
Figure 6-9

Riverine Grid: Sedimentation Rate

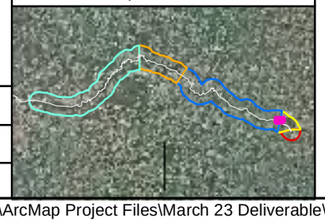
All Grid Cells

September 8 – September 15, 2010

Sheets 1 through 56



Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 01.95 - MP 02.75

SHEET 1 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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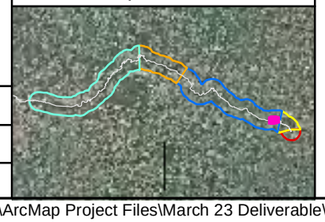
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

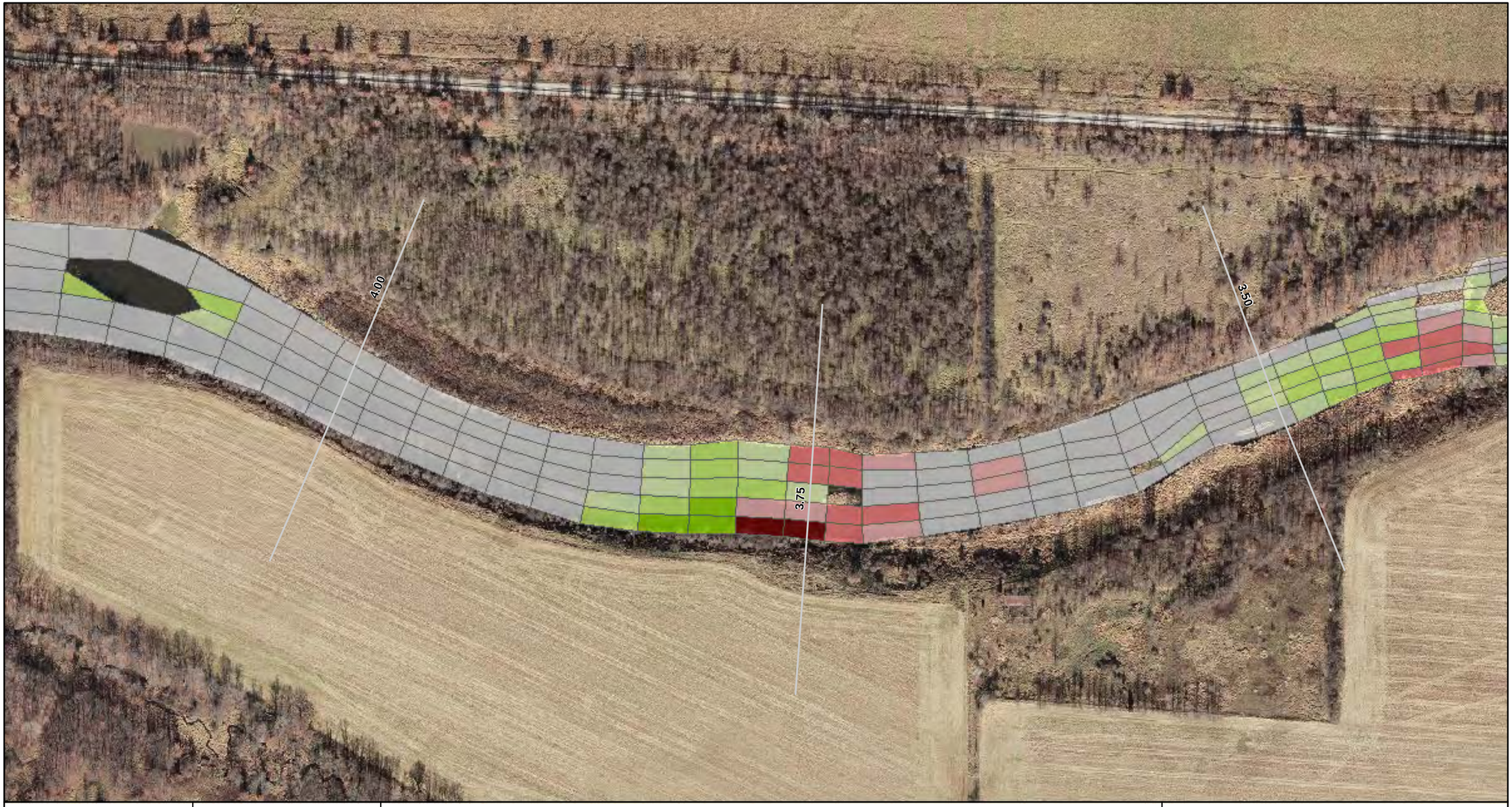
MP 02.60 - MP 03.40

SHEET 2 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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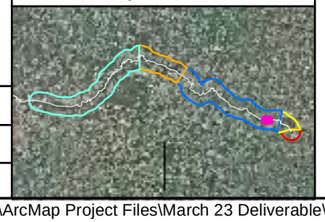
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 03.40 - MP 04.20

SHEET 3 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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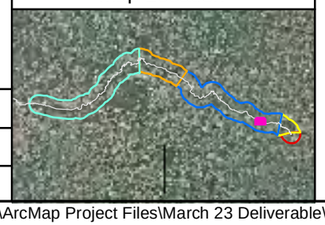
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 04.15 - MP 05.00

SHEET 4 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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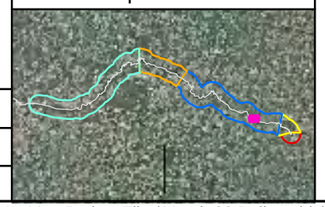
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 04.90 - MP 05.65

SHEET 5 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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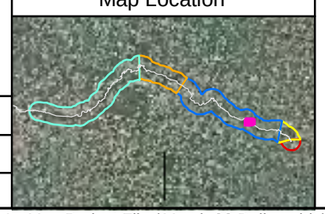
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

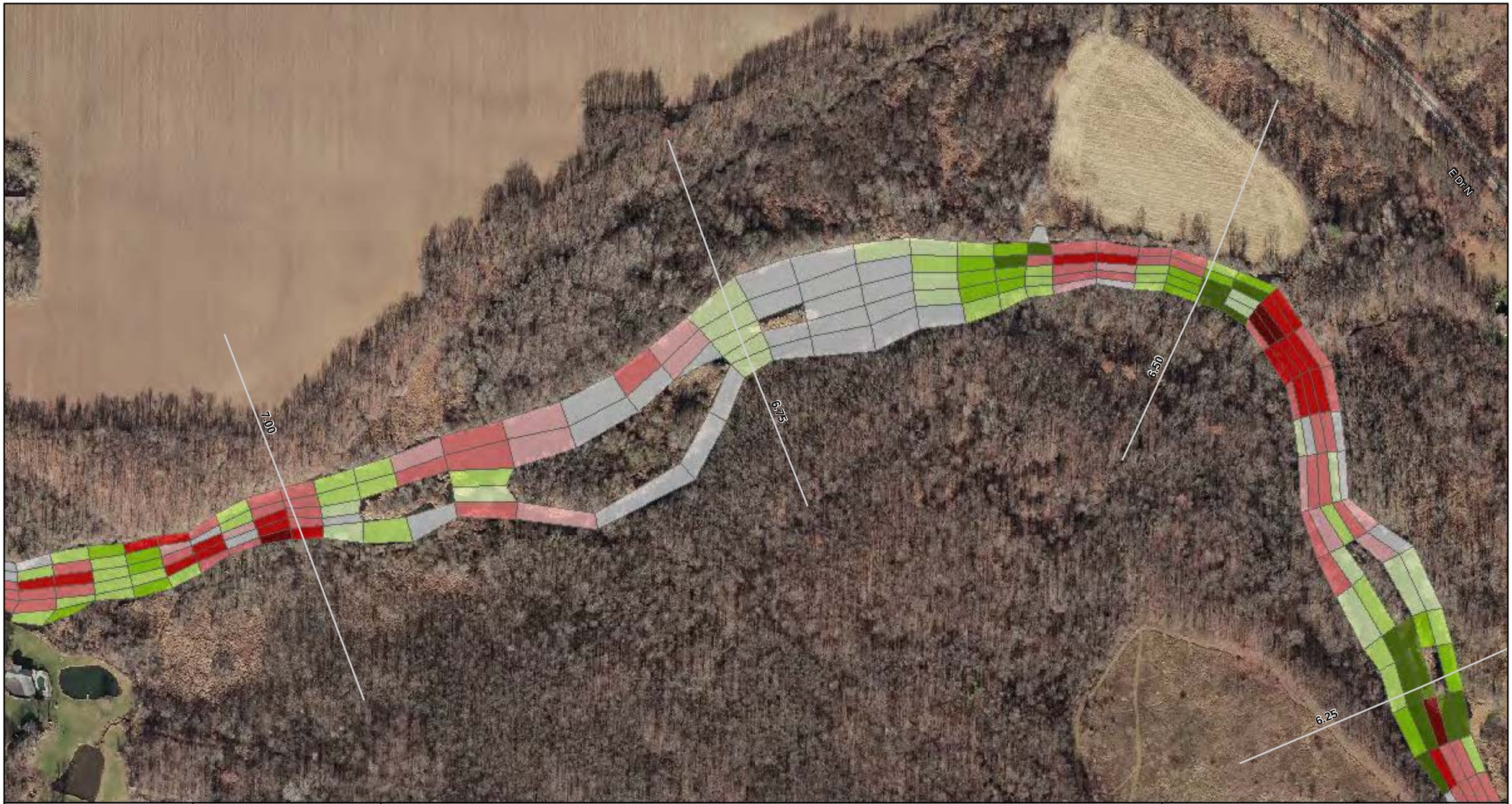
MP 05.65 - MP 06.30

SHEET 6 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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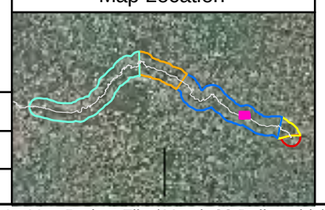
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 06.20 - MP 07.15

SHEET 7 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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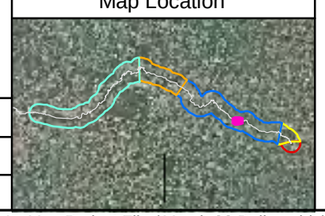
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

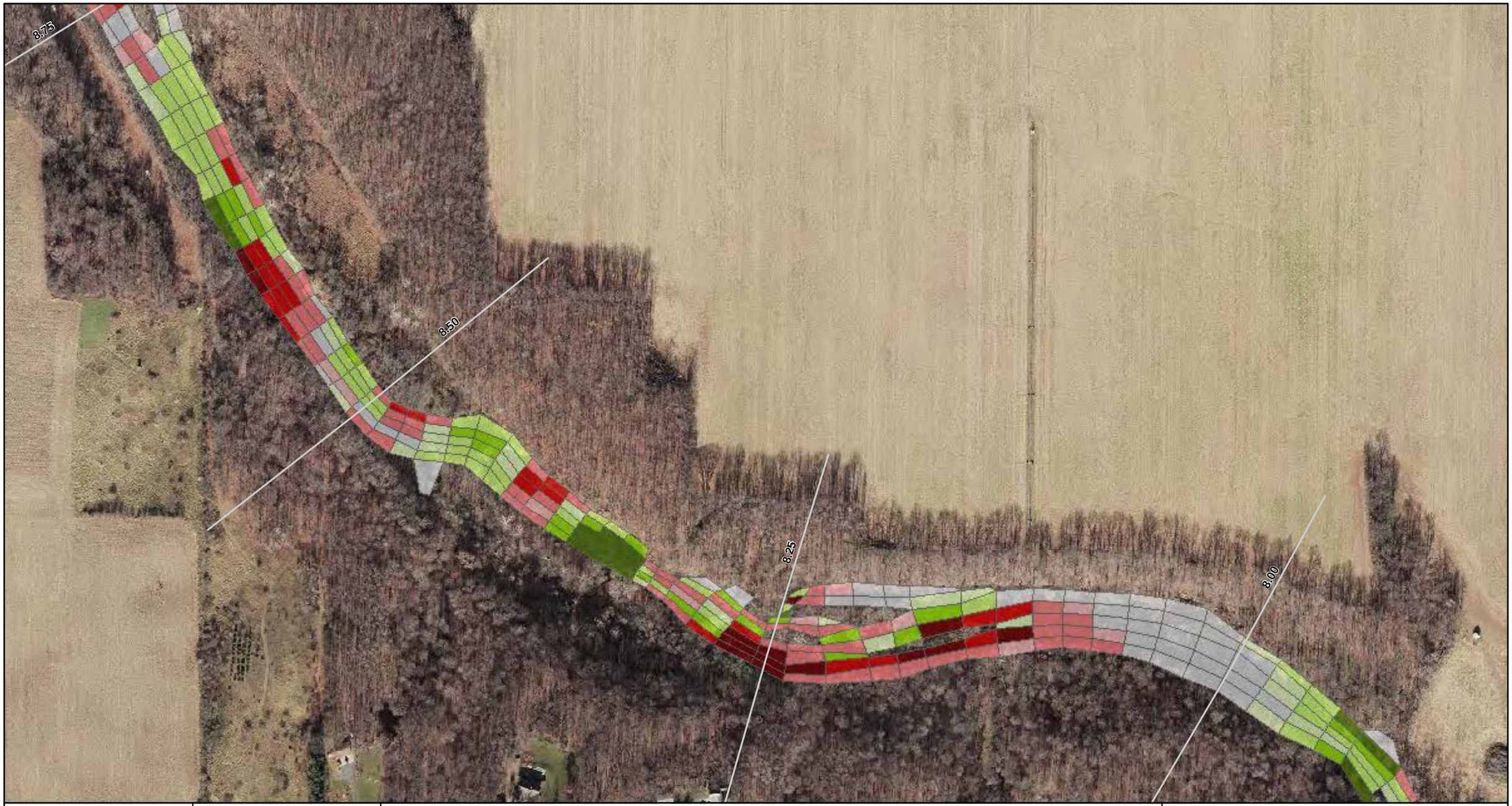
MP 07.15 - MP 07.95

SHEET 8 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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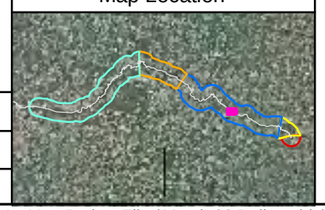
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

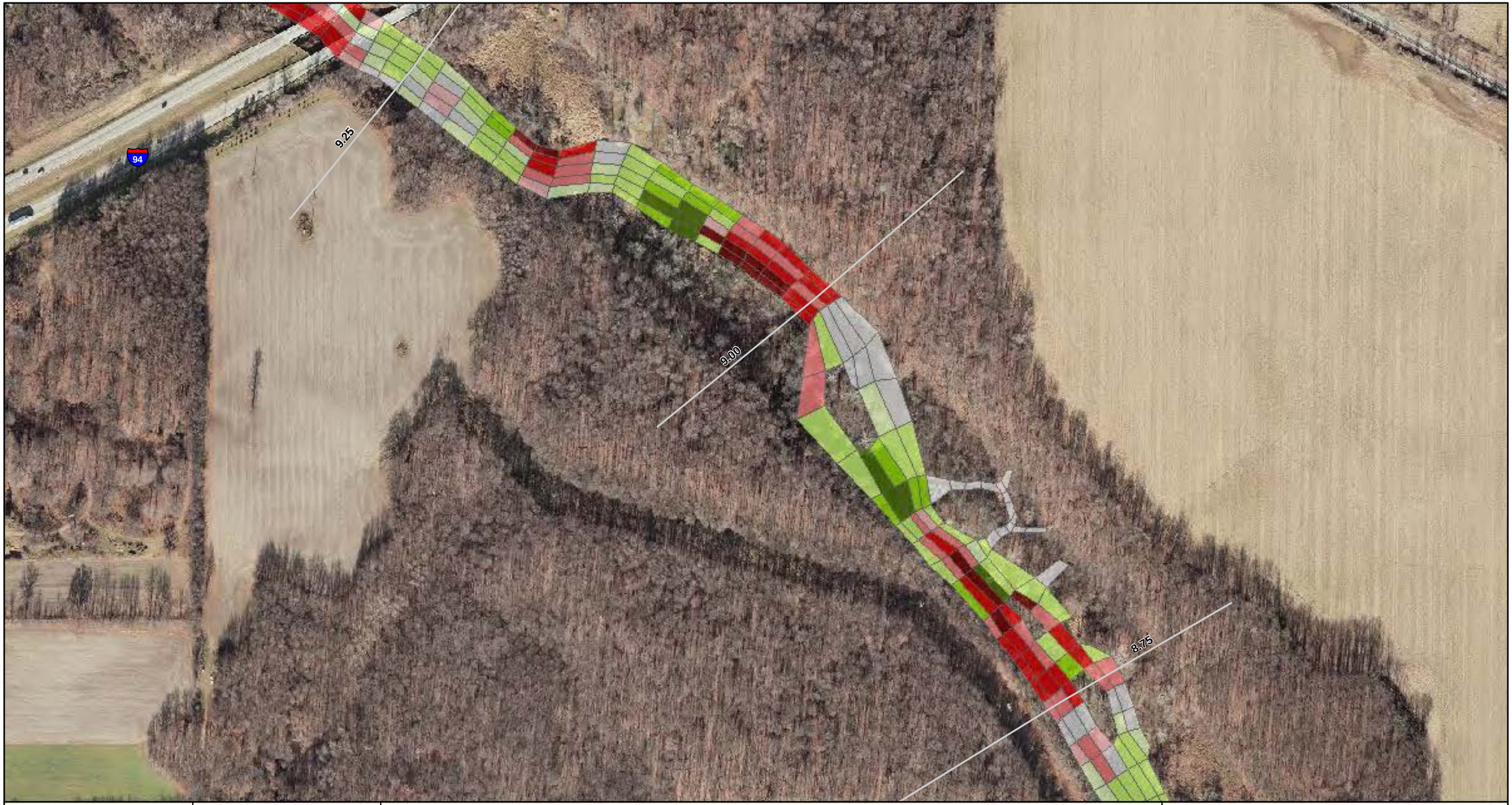
MP 07.90 - MP 08.75

SHEET 9 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
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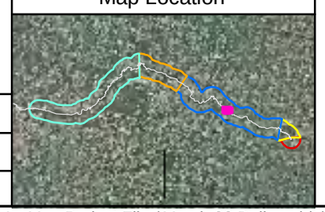
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)
All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500
Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 08.70 - MP 09.30

SHEET 10 OF 56

ENBRIDGE LINE 6B MP 608
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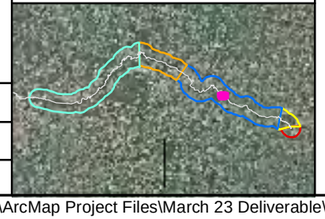
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 09.25 - MP 10.05

SHEET 11 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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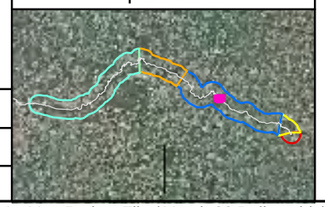
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)
All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500
Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 10.00 - MP 10.65

SHEET 12 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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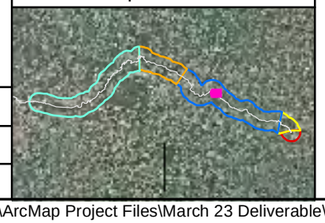
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)
All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500
Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 10.60 - MP 11.40

SHEET 13 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Sedimentation_Rate_Sept_2010.mxd

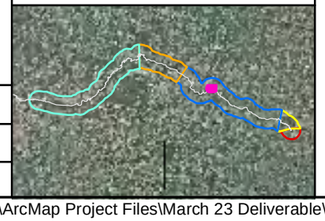
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 11.10 - MP 12.45

SHEET 14 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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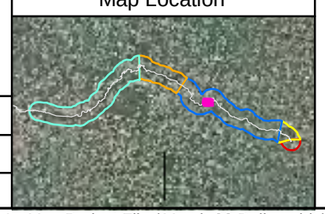
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 12.30 - MP 13.05

SHEET 15 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

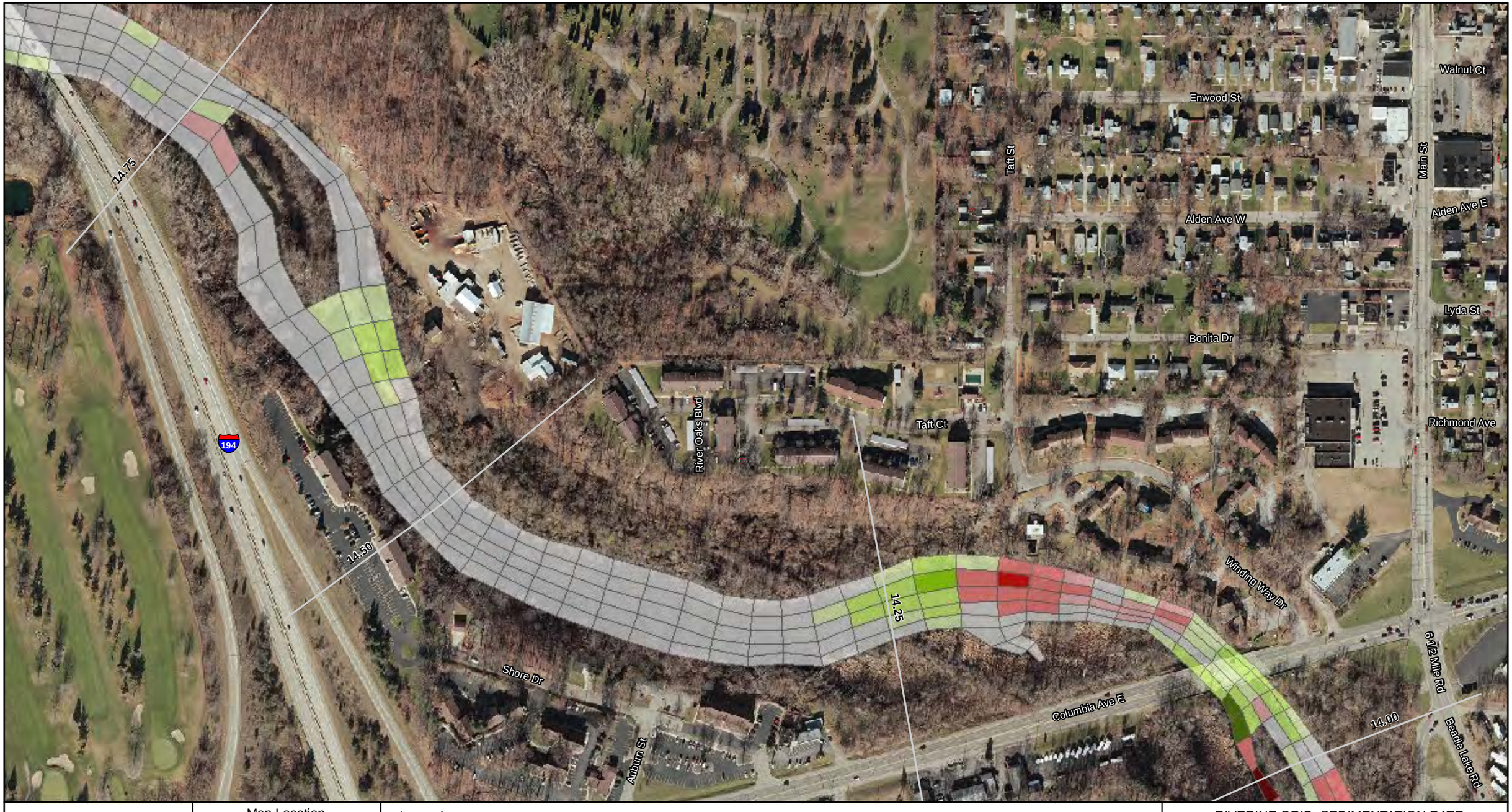
MP 13.00 - MP 14.10

SHEET 16 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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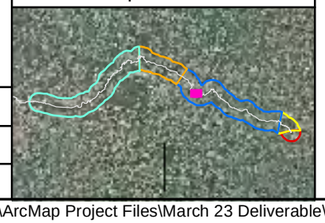
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 14.00 - MP 14.85

SHEET 17 OF 56

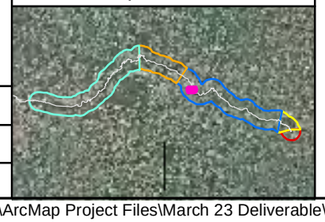
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



Map Location



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 14.65 - MP 15.25

SHEET 18 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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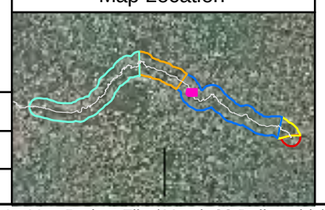
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 15.25 - MP 15.75

SHEET 19 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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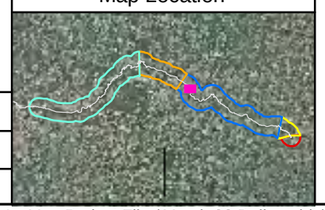
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 15.75 - MP 16.30

SHEET 20 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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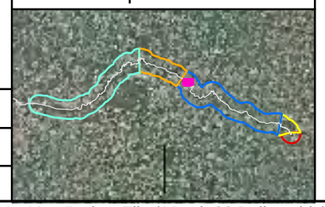
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 16.30 - MP 16.95

SHEET 21 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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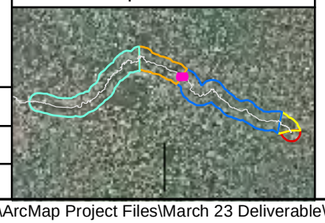
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 16.85 - MP 17.60

SHEET 22 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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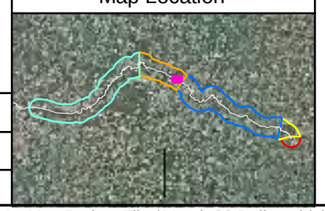
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)
All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500
Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 17.60 - MP 18.40

SHEET 23 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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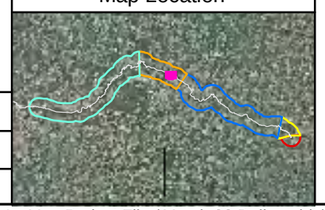
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

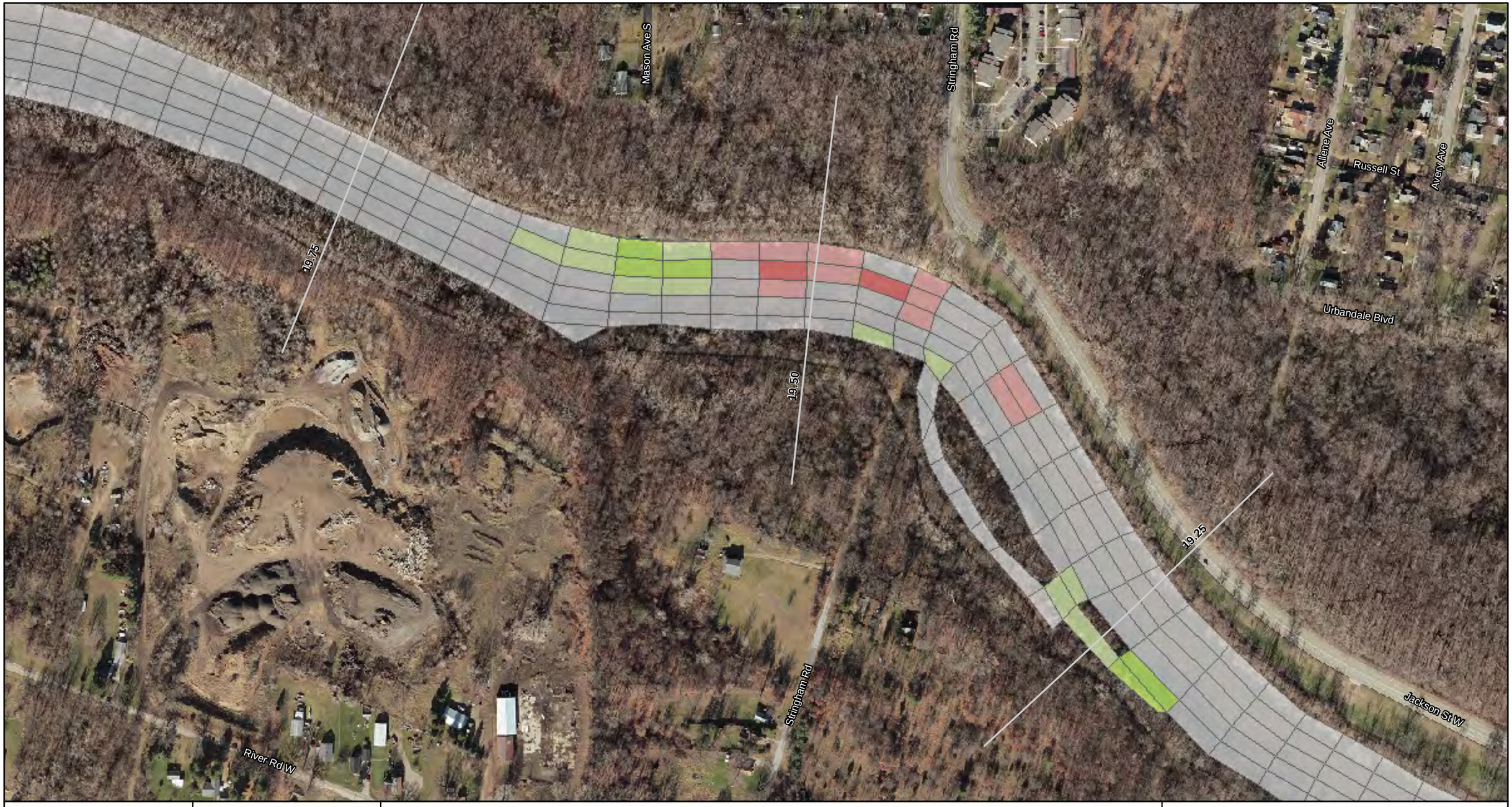
MP 18.30 - MP 19.15

SHEET 24 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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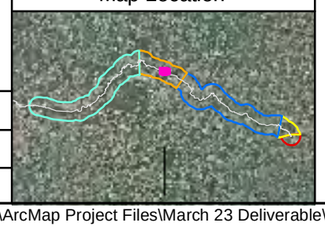
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

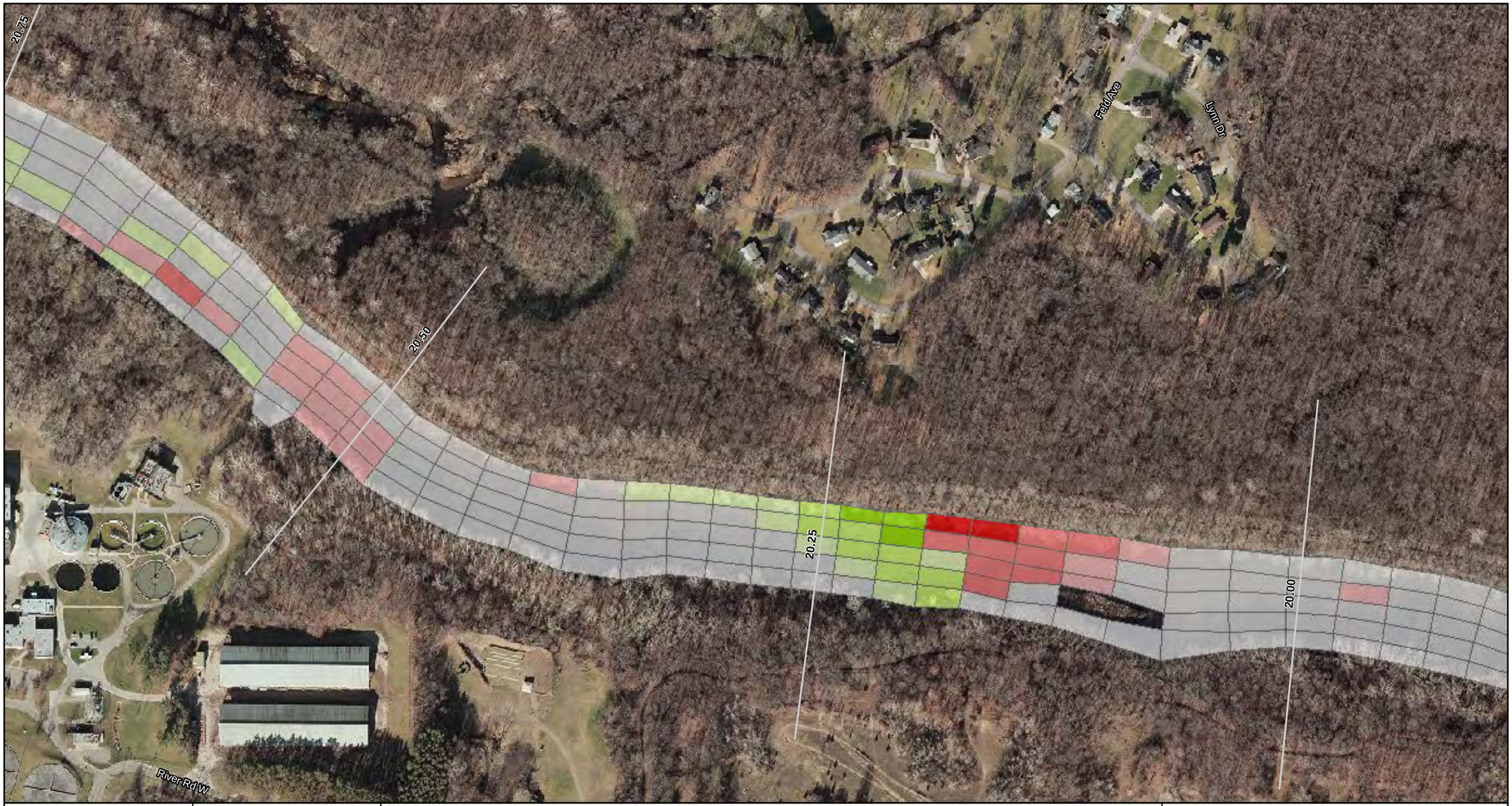
MP 19.10 - MP 19.95

SHEET 25 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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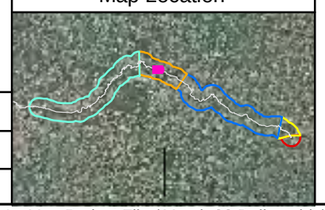
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 19.90 - MP 20.75

SHEET 26 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 20.70 - MP 21.50

SHEET 27 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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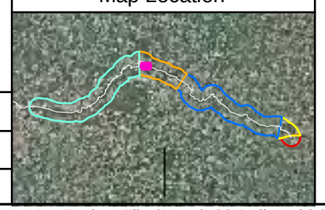
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 21.35 - MP 22.15

SHEET 28 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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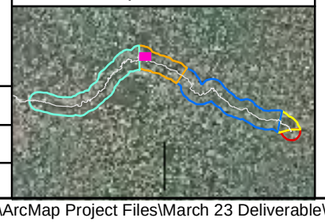
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)
All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500
Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

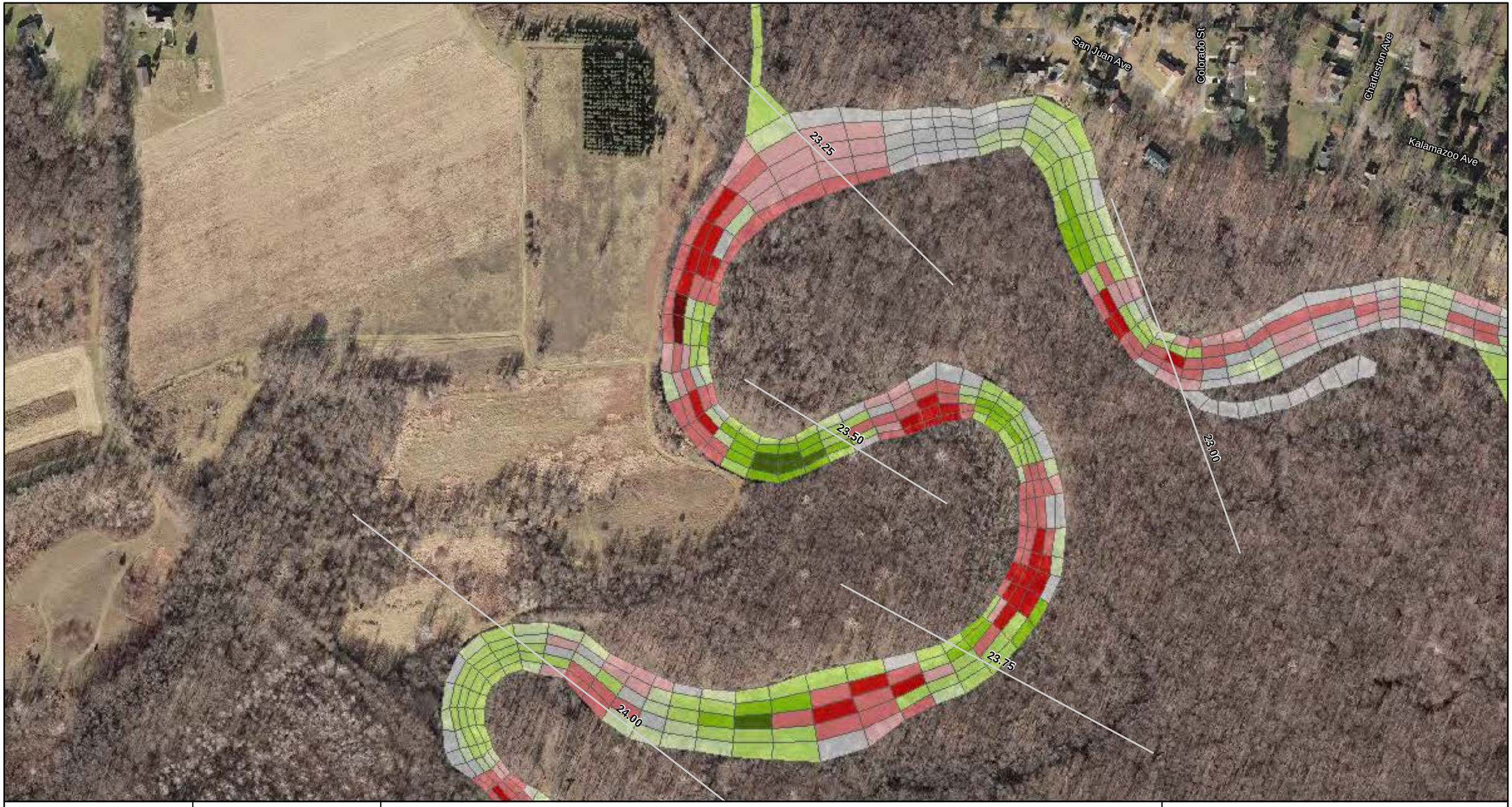
MP 22.15 - MP 22.90

SHEET 29 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Sedimentation_Rate_Sept_2010.mxd

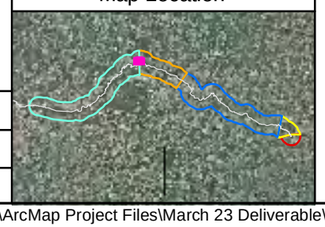
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 22.80 - MP 24.10

SHEET 30 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Sedimentation_Rate_Sept_2010.mxd

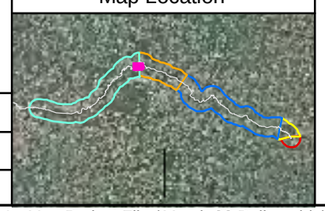
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 24.10 - MP 24.85

SHEET 31 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Sedimentation_Rate_Sept_2010.mxd

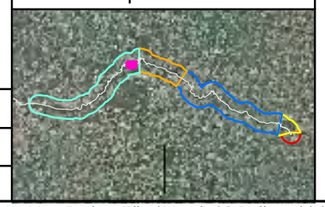
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 24.80 - MP 25.65

SHEET 32 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

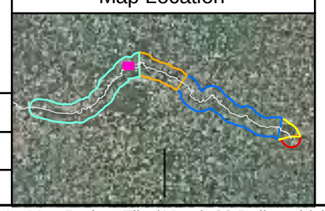
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Aerial Photography Date: November 2011



Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 25.55 - MP 26.40

SHEET 33 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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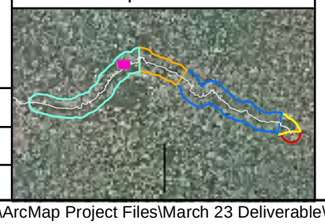
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

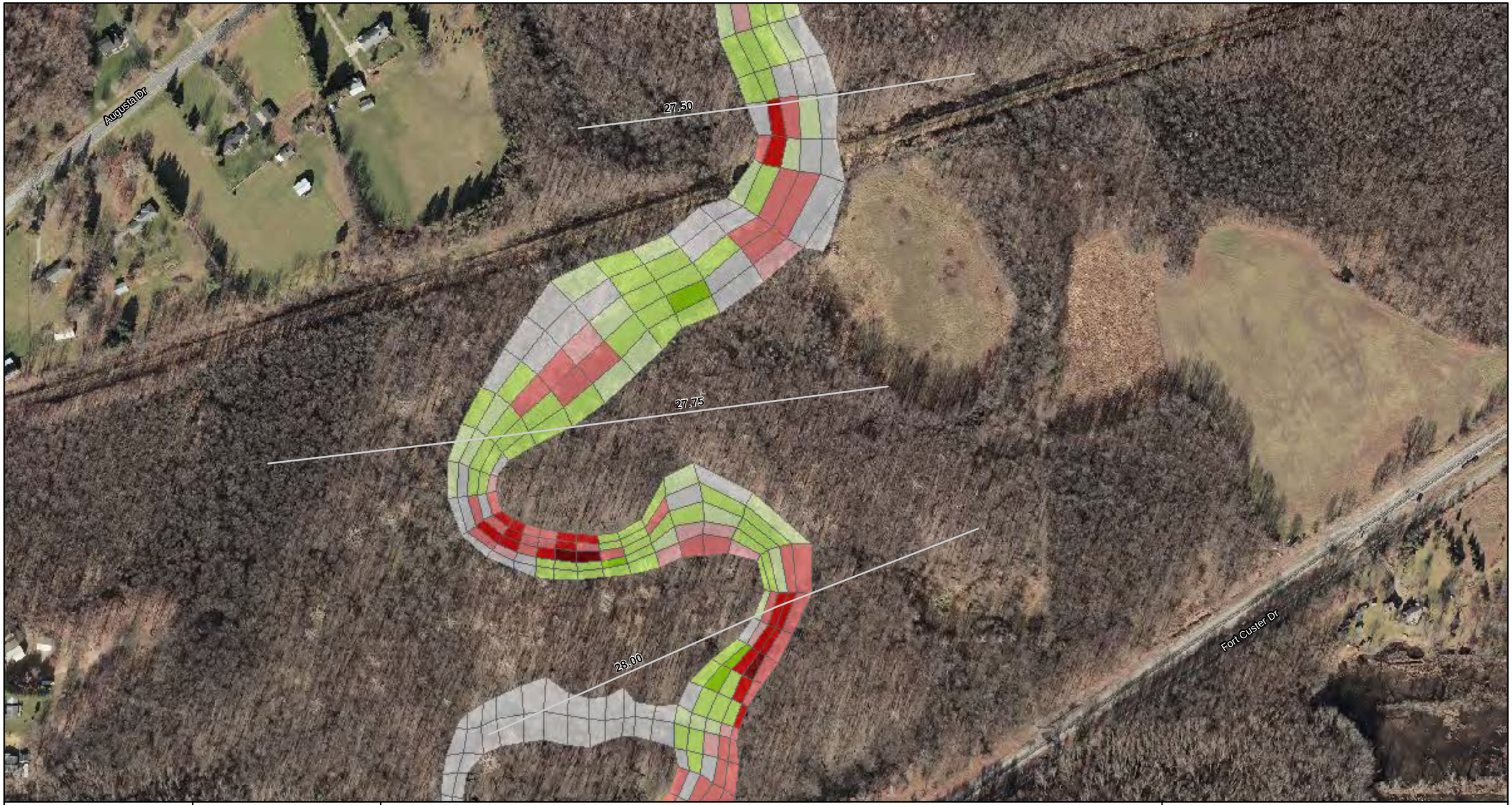
MP 26.40 - MP 27.45

SHEET 34 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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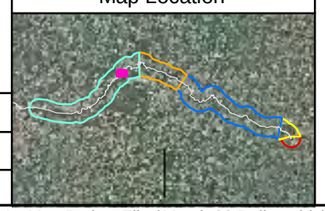
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 27.45 - MP 28.10

SHEET 35 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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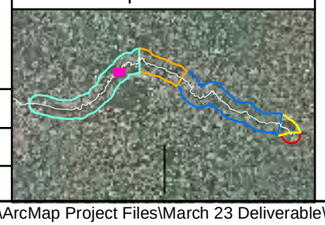
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 28.05 - MP 28.85

SHEET 36 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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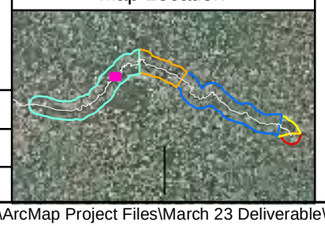
Aerial Photography Date: November 2011

Clinton St
Clinton St
Chestnut St
Webster St
Church St
Fayette St
Cass St
Cherry St
Lincoln St
28.75
29.00
29.25
29.50
Augusta Climax Rd
Fort Custer Rec Area Access

ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 28.85 - MP29.55

SHEET 37 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

29.50

29.75

Fort Custer Rec Area Service

Fort Custer Rec Area Access

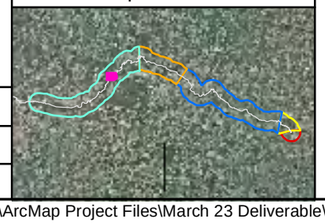
30.25

30.00

ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 29.50 - MP29.95

SHEET 38 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

30.00

30.25

30.50

30.75

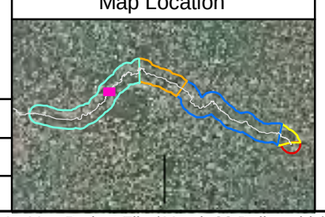
Fort Custer Rec Area BAS

Fort Custer Rec Area Access

ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 29.95 - MP 30.80

SHEET 39 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

30.75

31.00

31.25

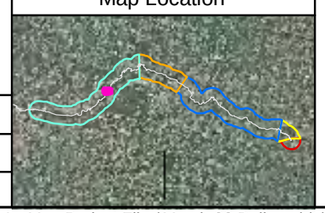
Bicycle Trail

Fort Custer Rec Area Access

ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 30.75 - MP 31.25

SHEET 40 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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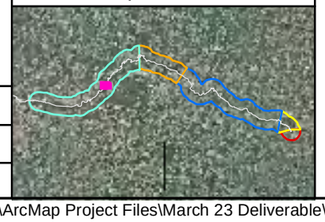
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 31.25 - MP 31.70

SHEET 41 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

31.75

32.00

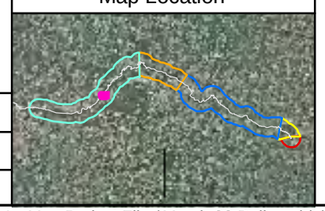
32.25

Bicycle Trail

ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

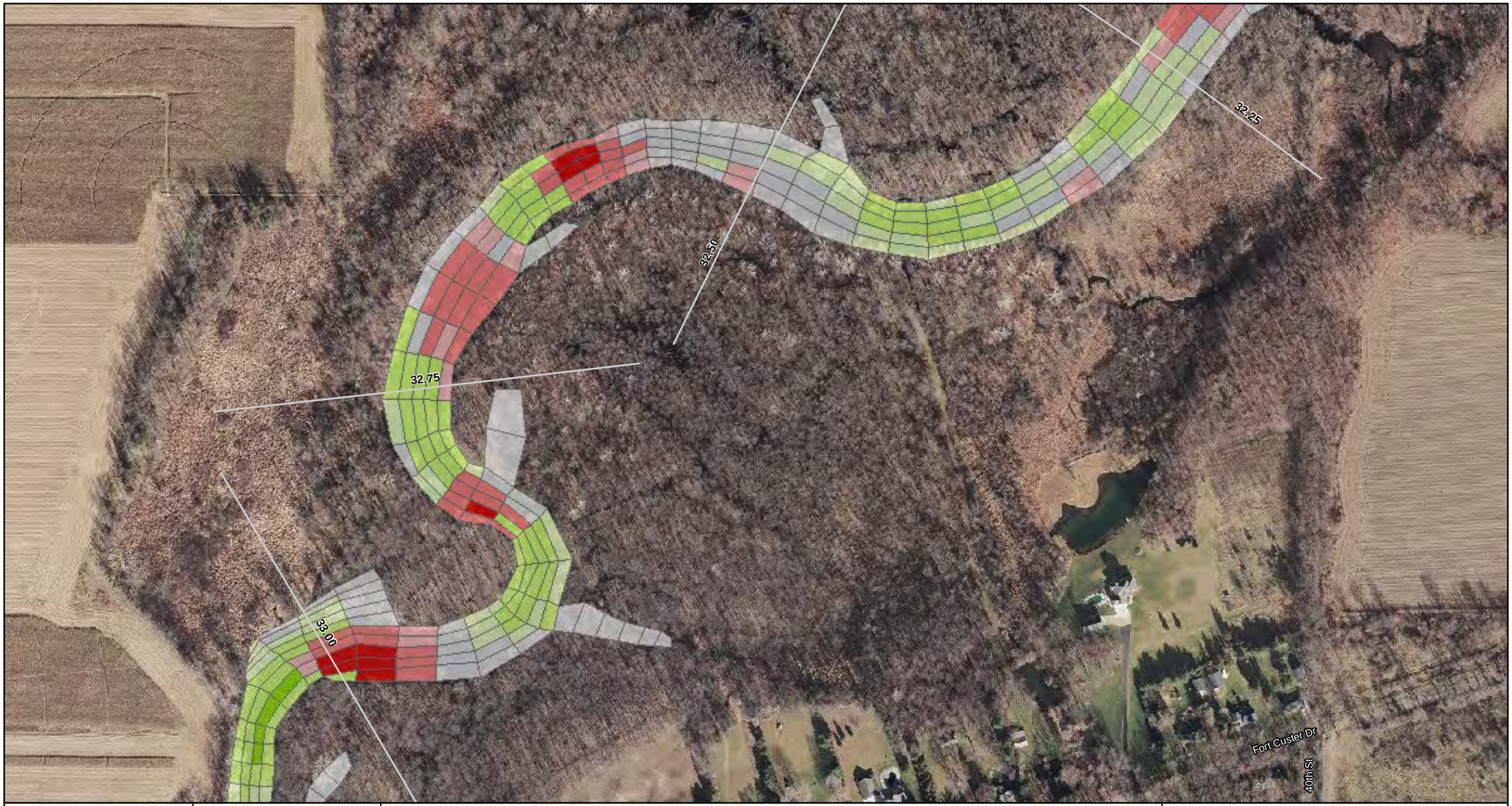
MP 31.65 - MP 32.25

SHEET 42 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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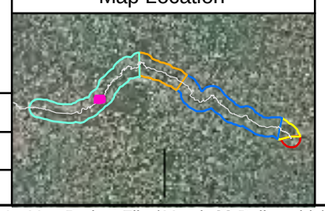
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 32.25 - MP 33.10

SHEET 43 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 33.10 - MP 33.70

SHEET 44 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Sedimentation_Rate_Sept_2010.mxd

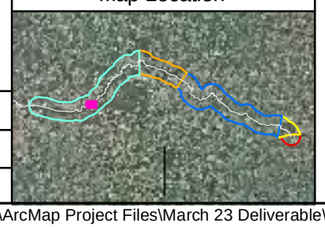
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

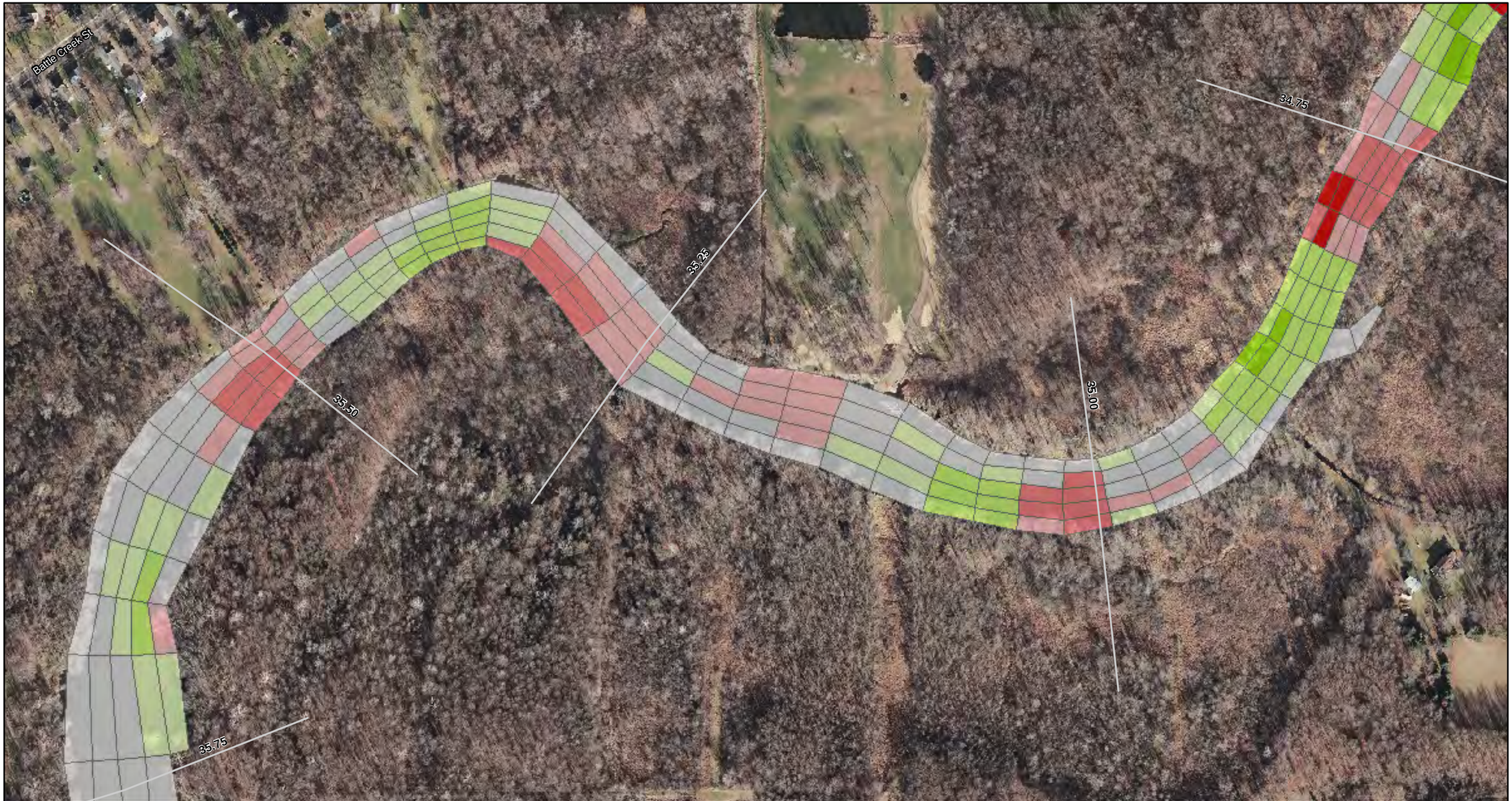
MP 33.70 - MP 34.70

SHEET 45 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

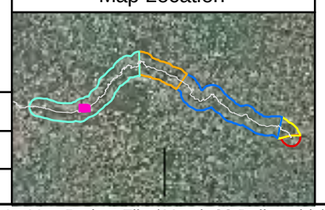
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Sedimentation_Rate_Sept_2010.mxd

Aerial Photography Date: November 2011



Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 34.70 - MP 35.75

SHEET 46 OF 56

ENBRIDGE LINE 6B MP 608
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ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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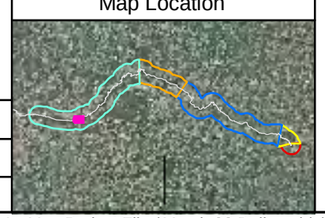
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

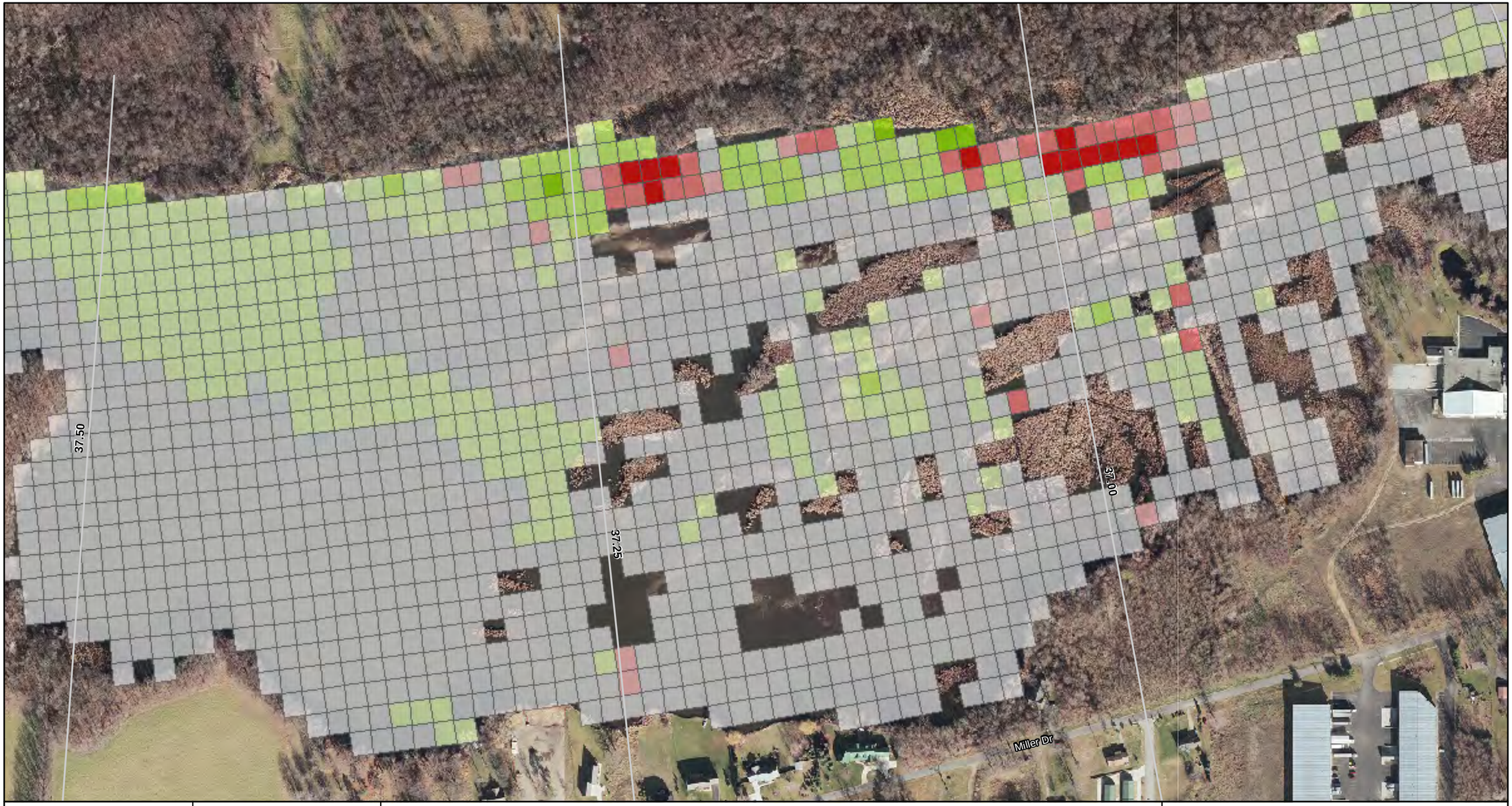
MP 35.75 - MP 36.80

SHEET 47 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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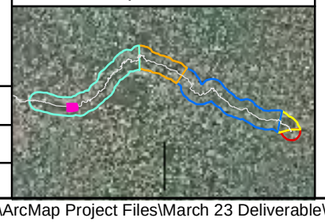
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

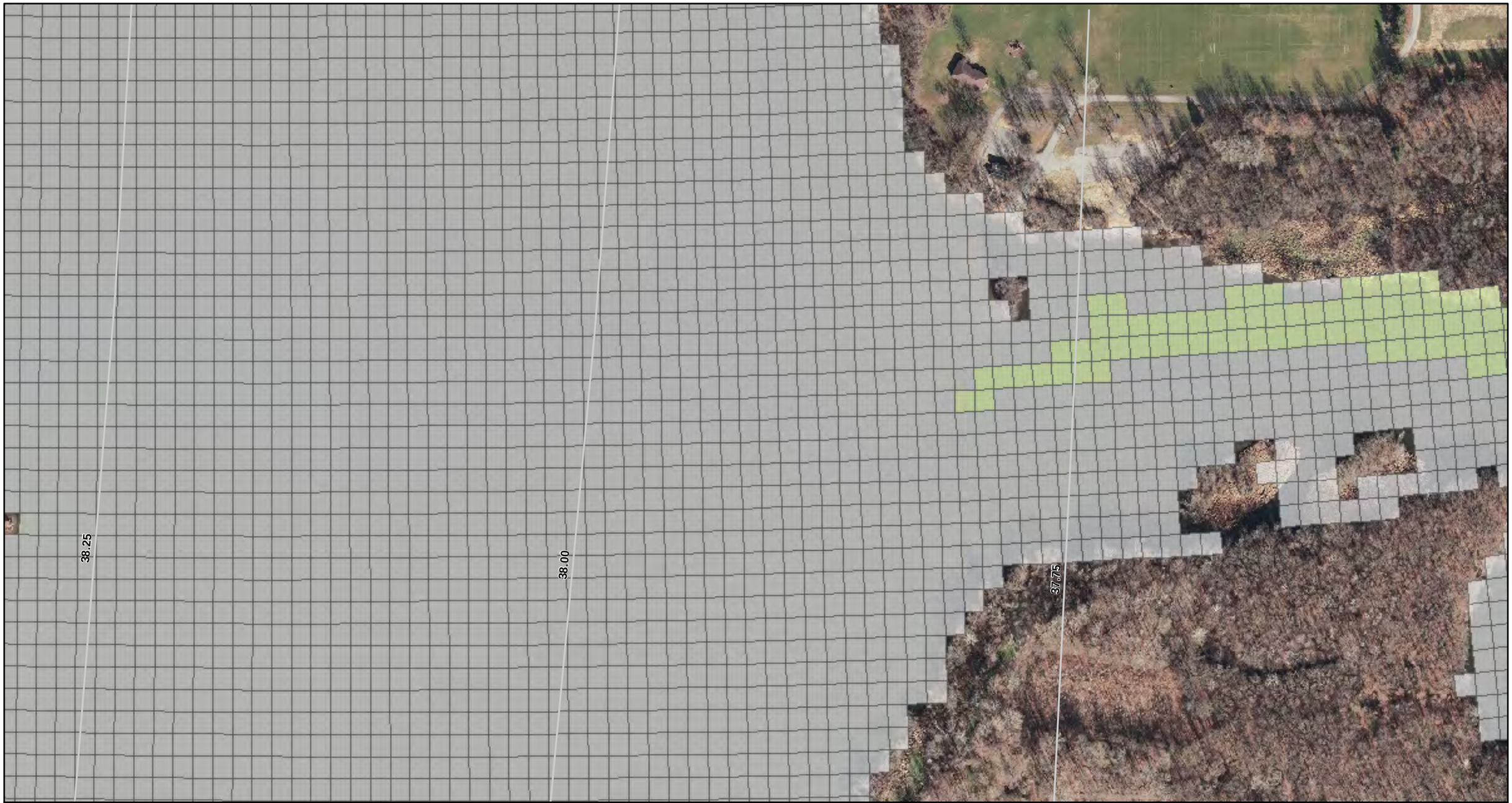
MP 36.80 - MP 37.55

SHEET 48 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
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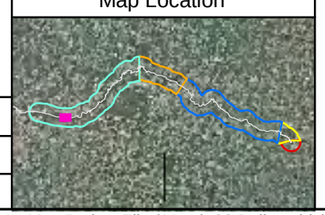
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

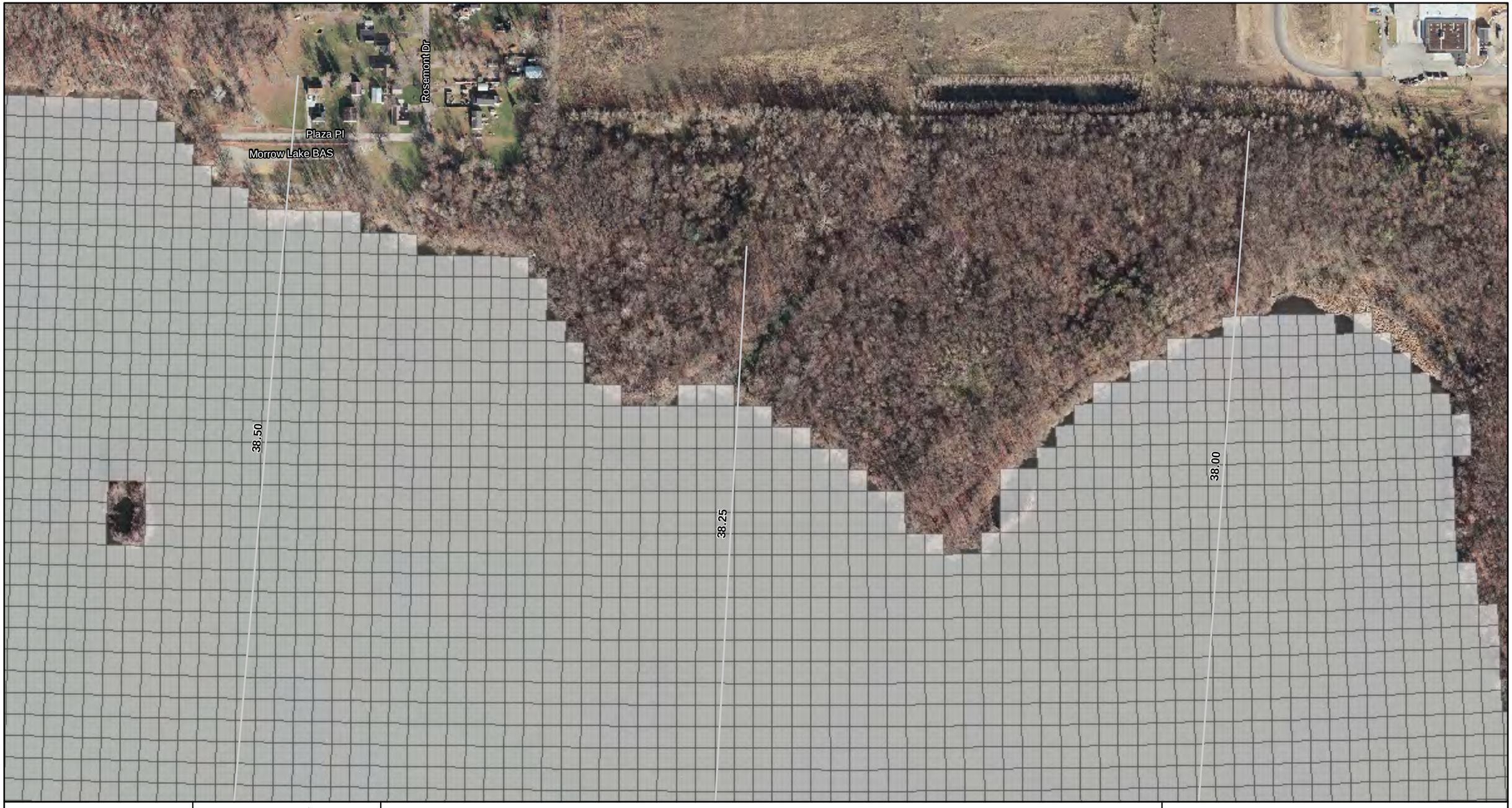
MP 37.55 - MP 38.30

SHEET 49 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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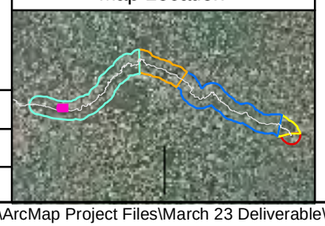
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

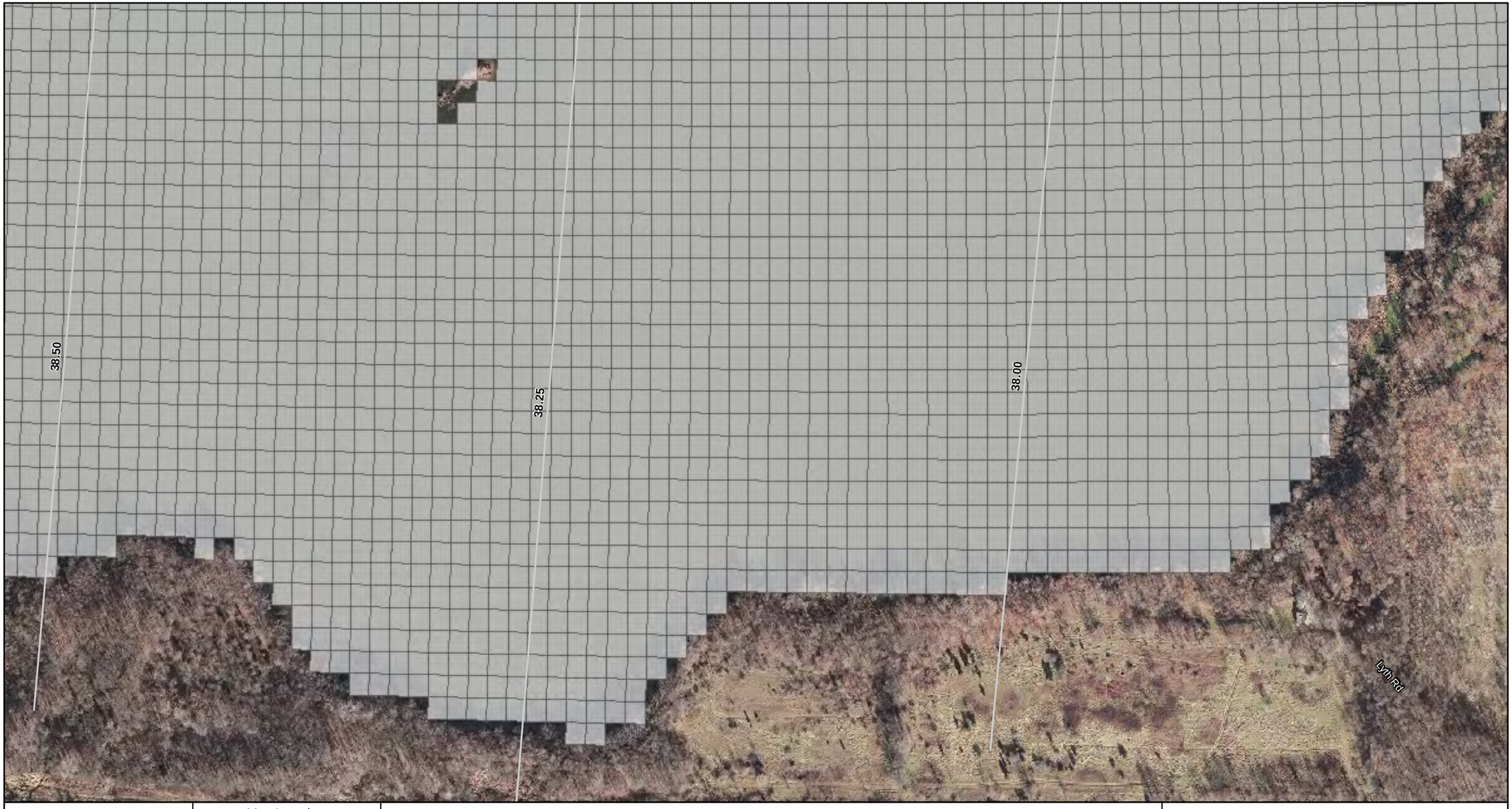
MP 37.80 - MP 38.60N

SHEET 50 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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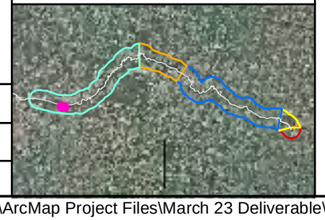
Aerial Photography Date: November 2011



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Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)
All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500
Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 37.80 - MP 38.60S

SHEET 51 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

39.00

38.75

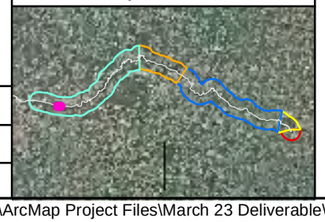
38.50

38.25

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Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 38.25 - MP 39.00C

SHEET 52 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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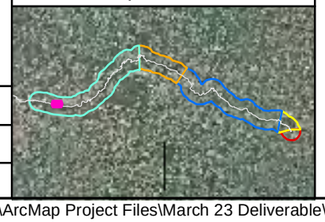
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 38.50 - MP 39.25N

SHEET 53 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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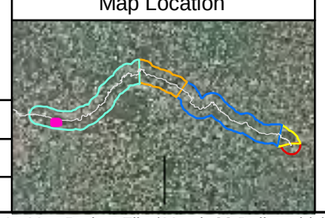
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 38.50 - MP 39.25S

SHEET 54 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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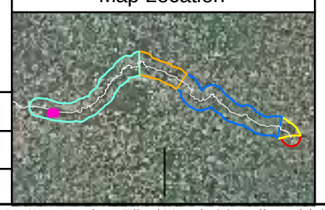
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 38.90 - MP 39.60S

SHEET 55 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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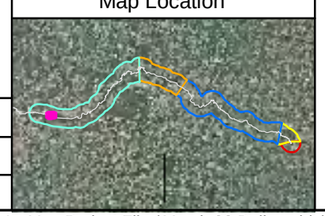
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
ALL GRID CELLS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 39.15 - MP 39.85

SHEET 56 OF 56

ENBRIDGE LINE 6B MP 608
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Aerial Photography Date: November 2011

Figure 6-10

Riverine Grid: Sedimentation Rate

Cells with Net Change in Silt or Clay Mass

September 8 – September 15, 2010

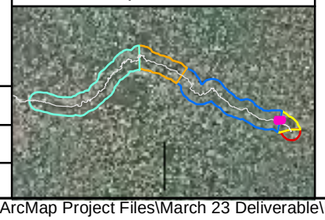
Sheets 1 through 56



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 01.95 - MP 02.75

SHEET 1 OF 56

ENBRIDGE LINE 6B MP 608
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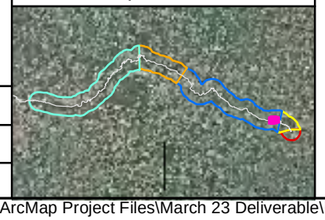
Aerial Photography Date: November 2011

3.25
3.00
2.75
2.50
Friendship Ln
Heather Dr
Peter Pan Ln
Kristen Dr
Squaw Creek Rd
River Park Dr

ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 02.60 - MP 03.40

SHEET 2 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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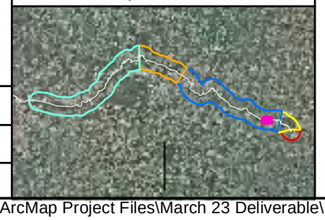
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

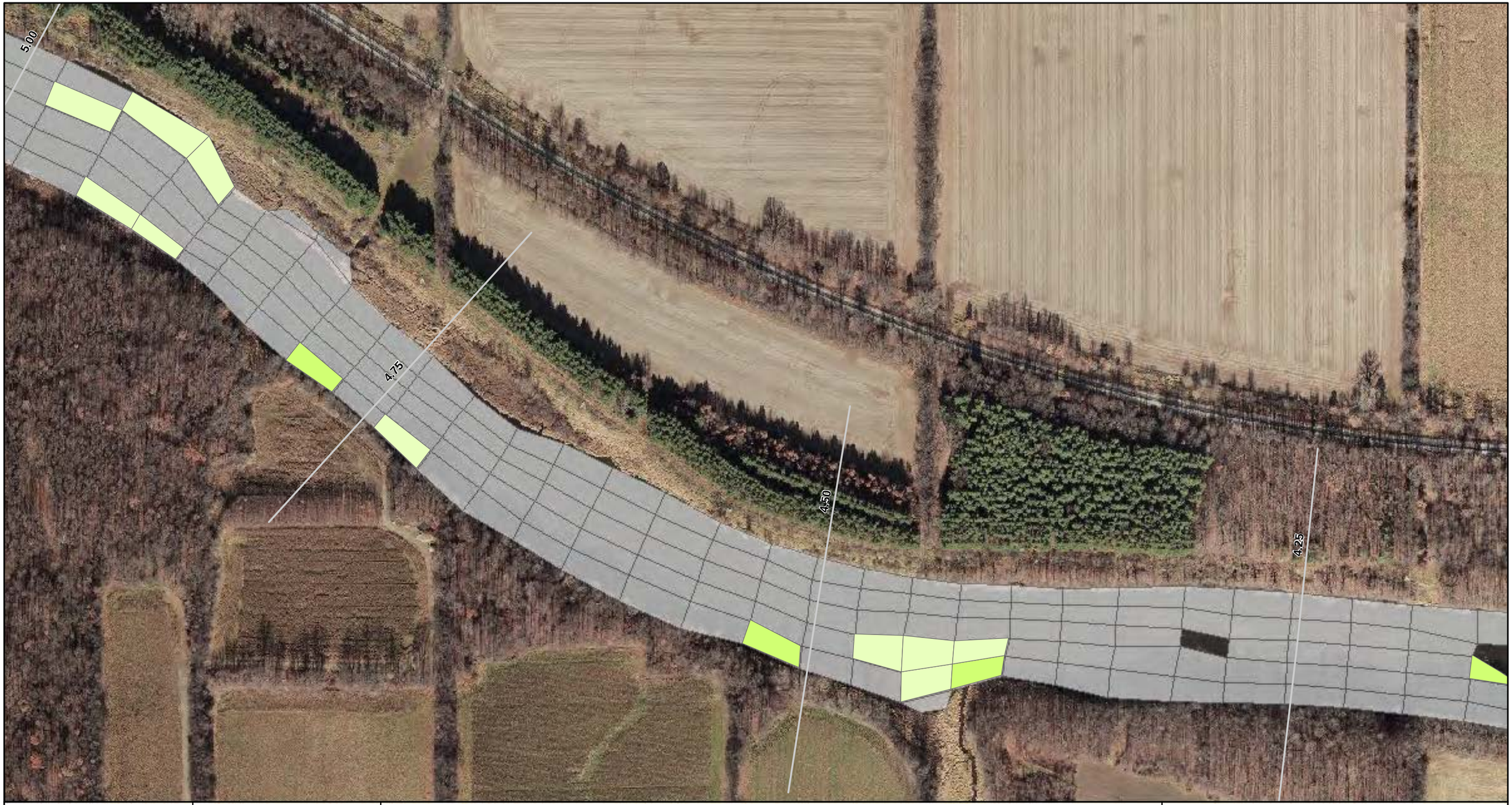
MP 03.40 - MP 04.20

SHEET 3 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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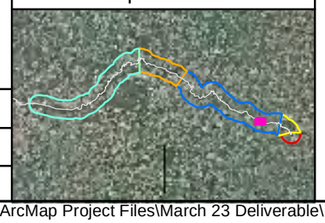
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 04.15 - MP 05.00

SHEET 4 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Sedimentation_Rate2_Sept_2010.mxd

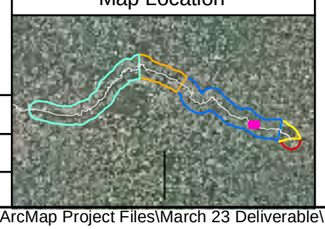
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 04.90 - MP 05.65

SHEET 5 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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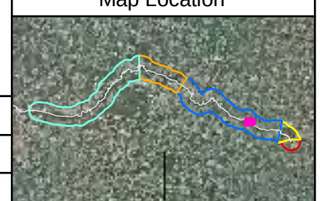
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 05.65 - MP 06.30

SHEET 6 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

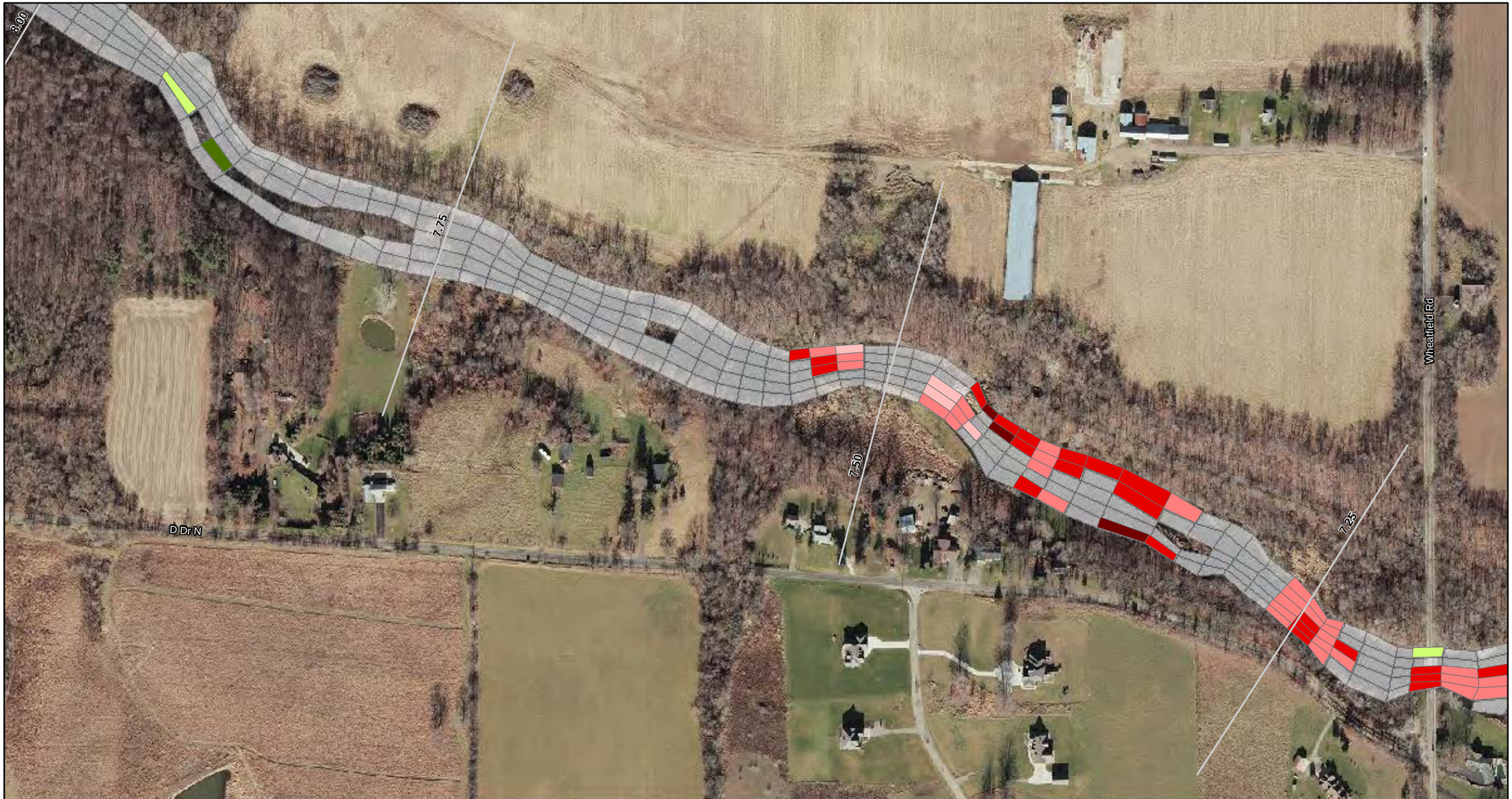
MP 06.20 - MP 07.15

SHEET 7 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 07.15 - MP 07.95

SHEET 8 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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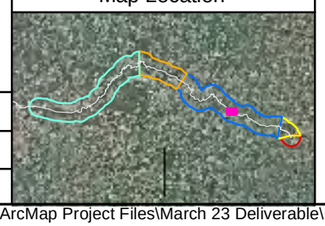
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

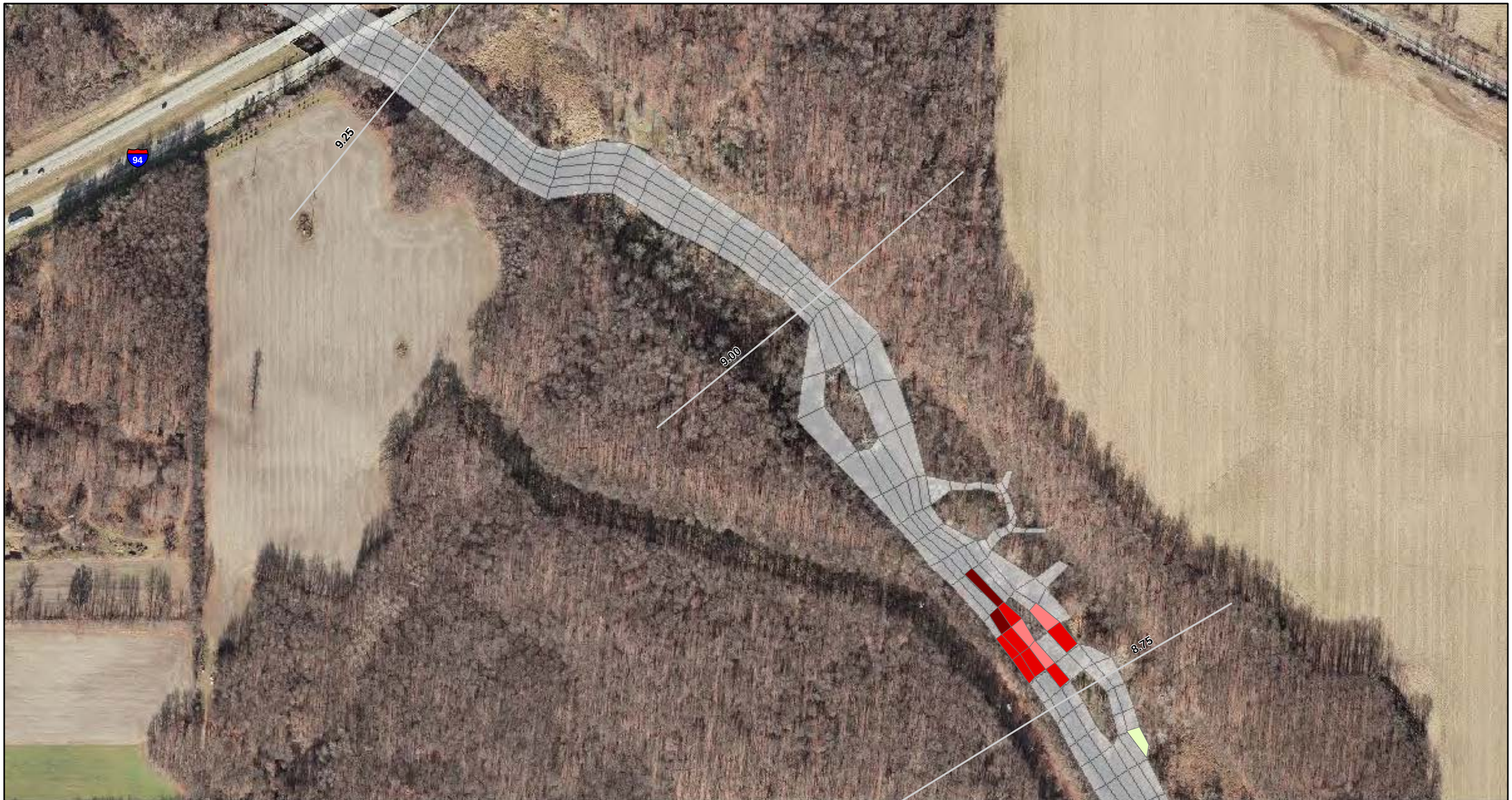
MP 07.90 - MP 08.75

SHEET 9 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 08.70 - MP 09.30

SHEET 10 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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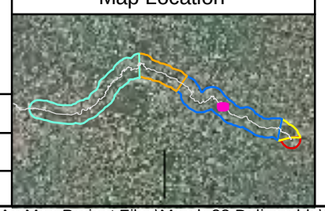
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

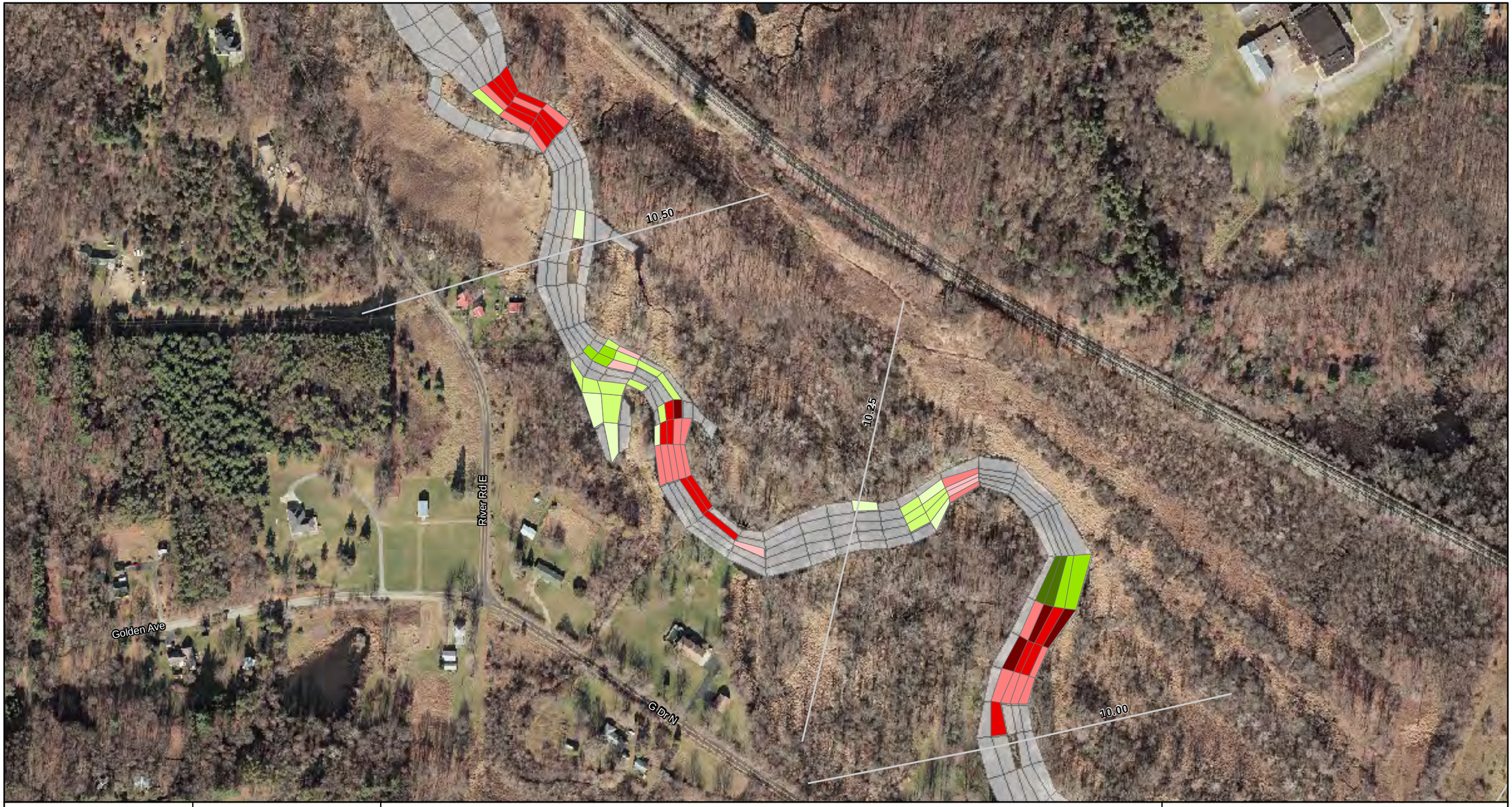
MP 09.25 - MP 10.05

SHEET 11 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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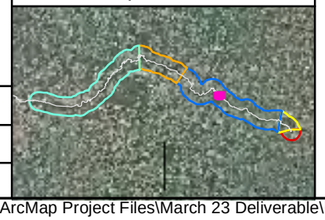
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 10.00 - MP 10.65

SHEET 12 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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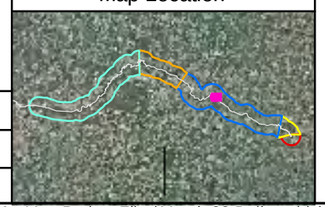
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 10.60 - MP 11.40

SHEET 13 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

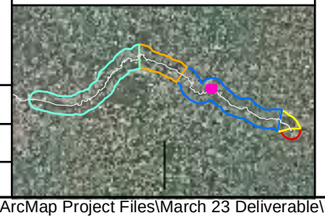
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Aerial Photography Date: November 2011



ENBRIDGE	
Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 11.10 - MP 12.45

SHEET 14 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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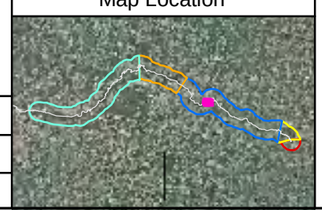
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

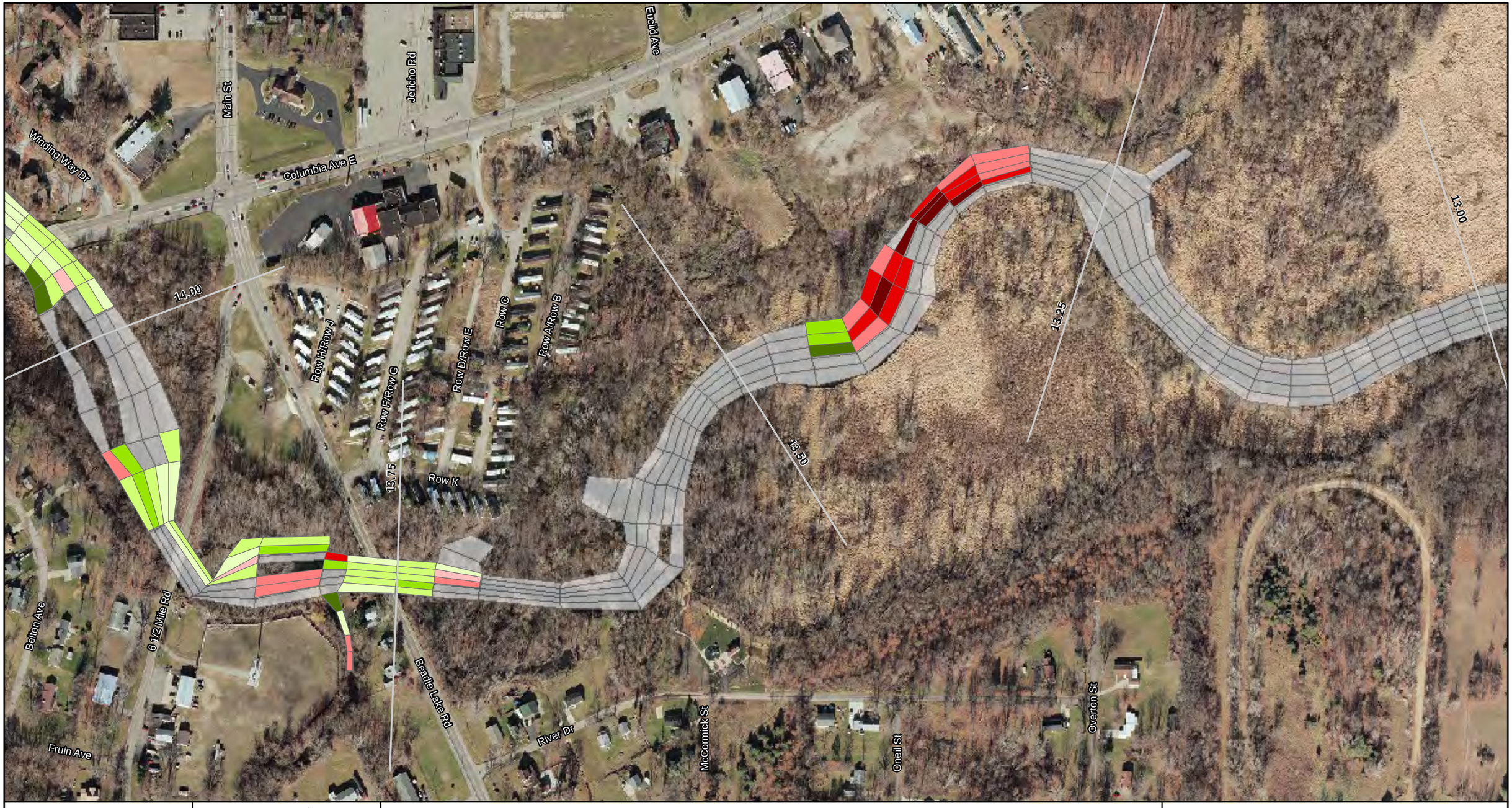
MP 12.30 - MP 13.05

SHEET 15 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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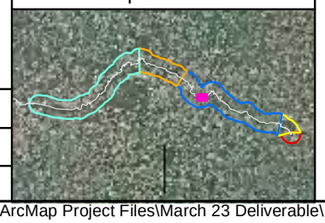
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

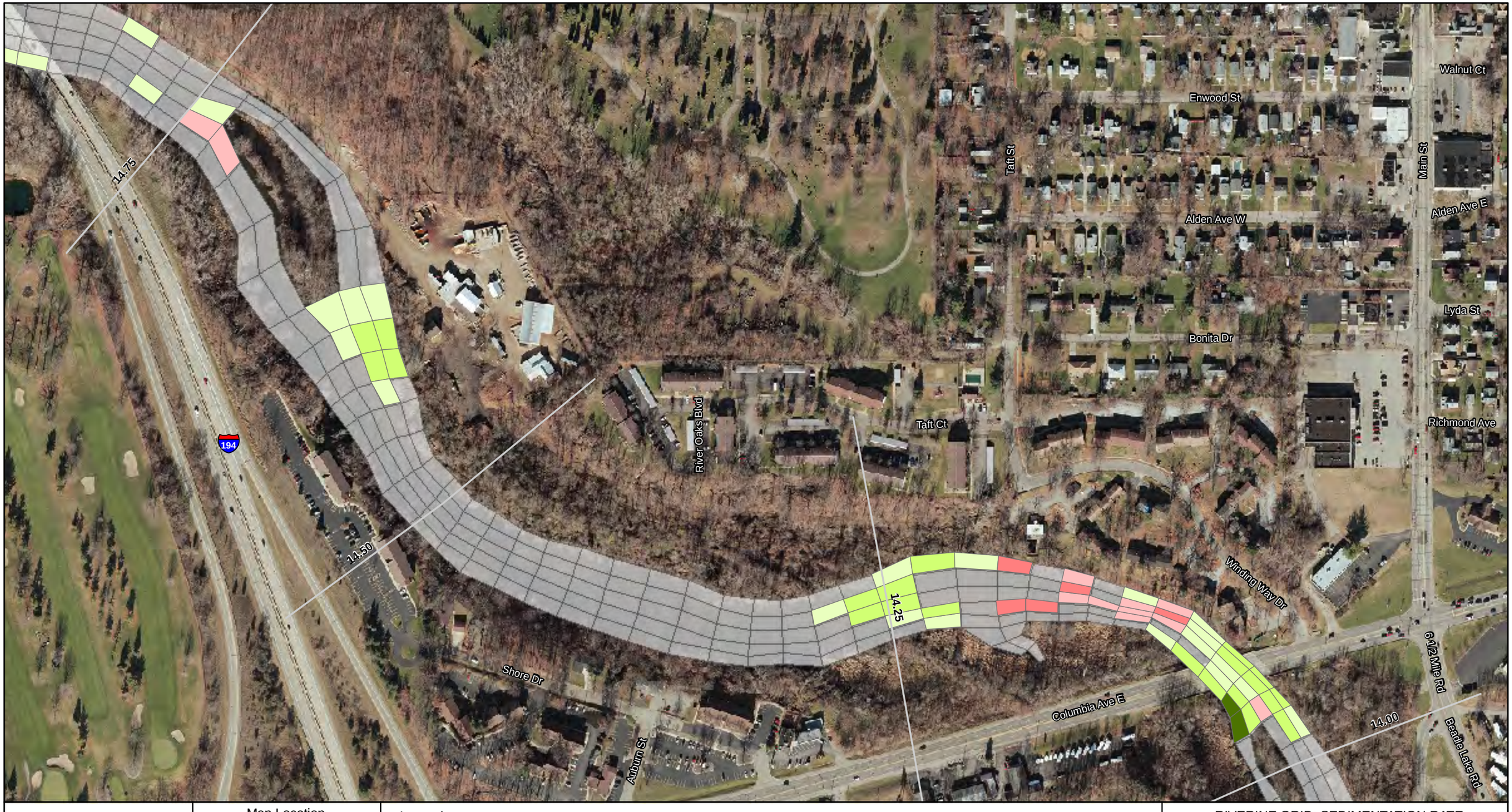
MP 13.00 - MP 14.10

SHEET 16 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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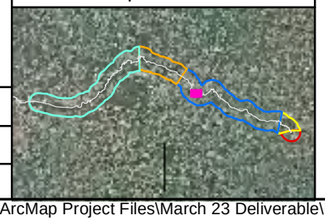
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 14.00 - MP 14.85

SHEET 17 OF 56

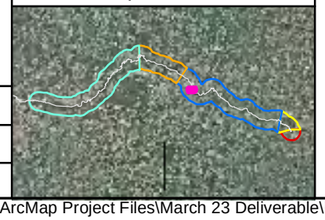
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



Map Location



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 14.65 - MP 15.25

SHEET 18 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 15.25 - MP 15.75

SHEET 19 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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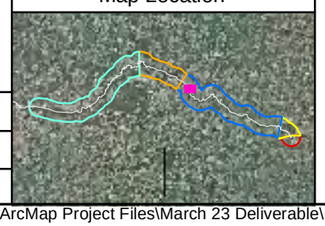
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 15.75 - MP 16.30

SHEET 20 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Sedimentation_Rate2_Sept_2010.mxd

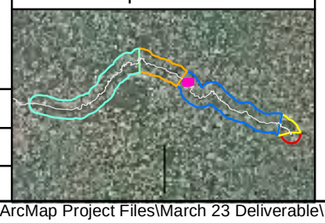
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 16.30 - MP 16.95

SHEET 21 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 16.85 - MP 17.60

SHEET 22 OF 56

ENBRIDGE LINE 6B MP 608
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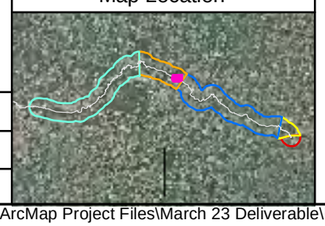
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 17.60 - MP 18.40

SHEET 23 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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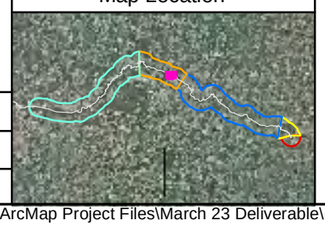
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 18.30 - MP 19.15

SHEET 24 OF 56

ENBRIDGE LINE 6B MP 608
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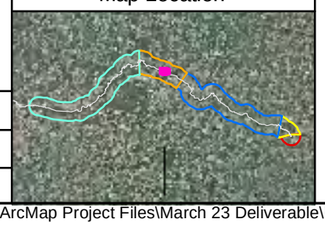
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 19.10 - MP 19.95

SHEET 25 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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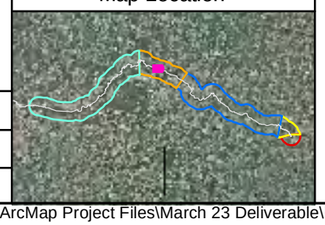
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 19.90 - MP 20.75

SHEET 26 OF 56

ENBRIDGE LINE 6B MP 608
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ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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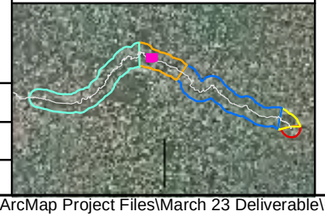
Aerial Photography Date: November 2011



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Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 20.70 - MP 21.50

SHEET 27 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 21.35 - MP 22.15

SHEET 28 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
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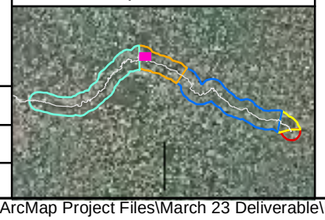
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 22.15 - MP 22.90

SHEET 29 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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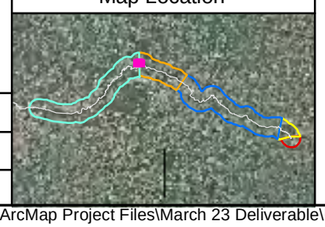
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 22.80 - MP 24.10

SHEET 30 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
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Aerial Photography Date: November 2011

24.00
24.25
24.50
24.75
River Rd W
Fort Custer Dr
County Line Rd

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Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 24.10 - MP 24.85

SHEET 31 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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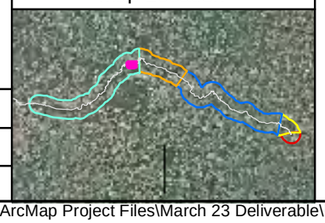
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 24.80 - MP 25.65

SHEET 32 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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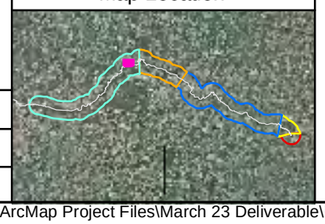
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 25.55 - MP 26.40

SHEET 33 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

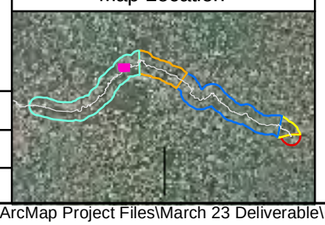
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Aerial Photography Date: November 2011



Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 26.40 - MP 27.45

SHEET 34 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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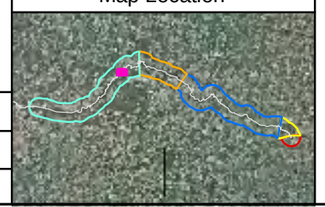
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 27.45 - MP 28.10

SHEET 35 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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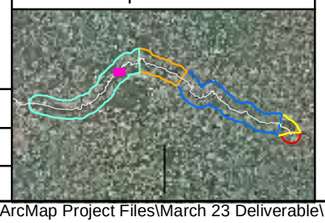
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 28.05 - MP 28.85

SHEET 36 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

Clinton St
Clinton St
Chestnut St
Webster St
Church St
Fayette St
Cass St
Cherry St
Lincoln St
28.75
29.00
29.25
29.50
Augusta Climax Rd
Fort Custer Rec Area Access

ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 28.85 - MP29.55

SHEET 37 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Sedimentation_Rate2_Sept_2010.mxd

Aerial Photography Date: November 2011

29.50

29.75

30.00

30.25

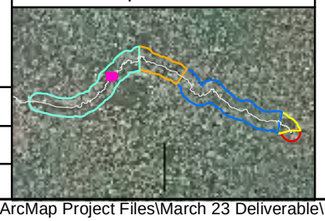
Fort Custer Rec Area Service

Fort Custer Rec Area Access

ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 29.50 - MP29.95

SHEET 38 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

30.00

30.25

30.50

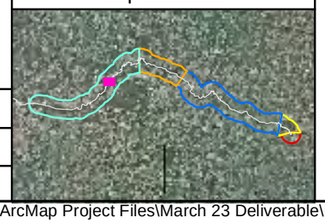
30.75

Fort Custer Rec Area BAS

Fort Custer Rec Area Access

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 29.95 - MP 30.80

SHEET 39 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 30.75 - MP 31.25

SHEET 40 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 31.25 - MP 31.70

SHEET 41 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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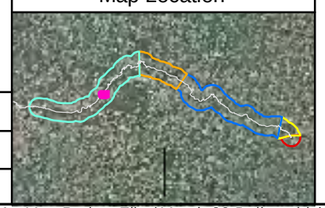
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 31.65 - MP 32.25

SHEET 42 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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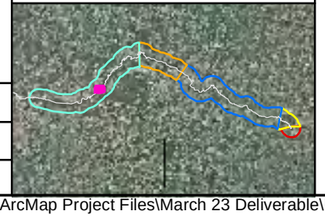
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 32.25 - MP 33.10

SHEET 43 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

33.00
33.25
33.50
33.75
Fort Custer Dr

ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 33.10 - MP 33.70

SHEET 44 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 33.70 - MP 34.70

SHEET 45 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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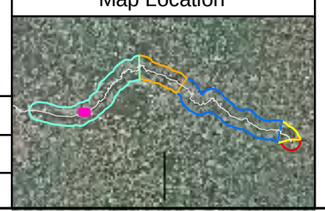
Aerial Photography Date: November 2011



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Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 34.70 - MP 35.75

SHEET 46 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

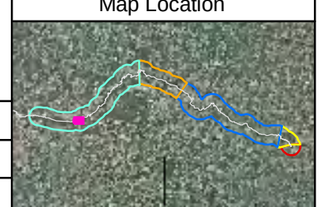
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Aerial Photography Date: November 2011



Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

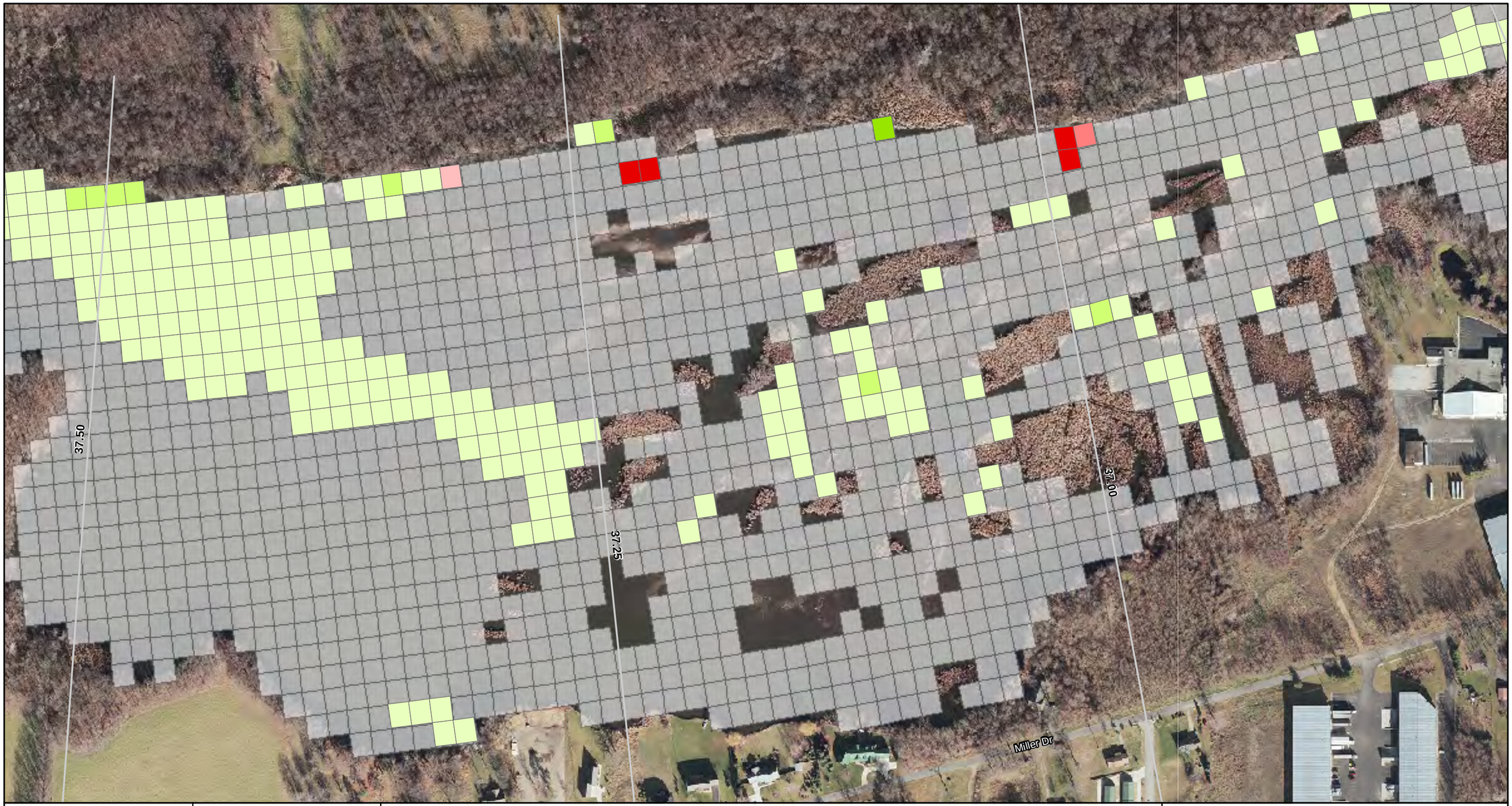
MP 35.75 - MP 36.80

SHEET 47 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



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Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 36.80 - MP 37.55

SHEET 48 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

38.25

38.00

37.75

ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

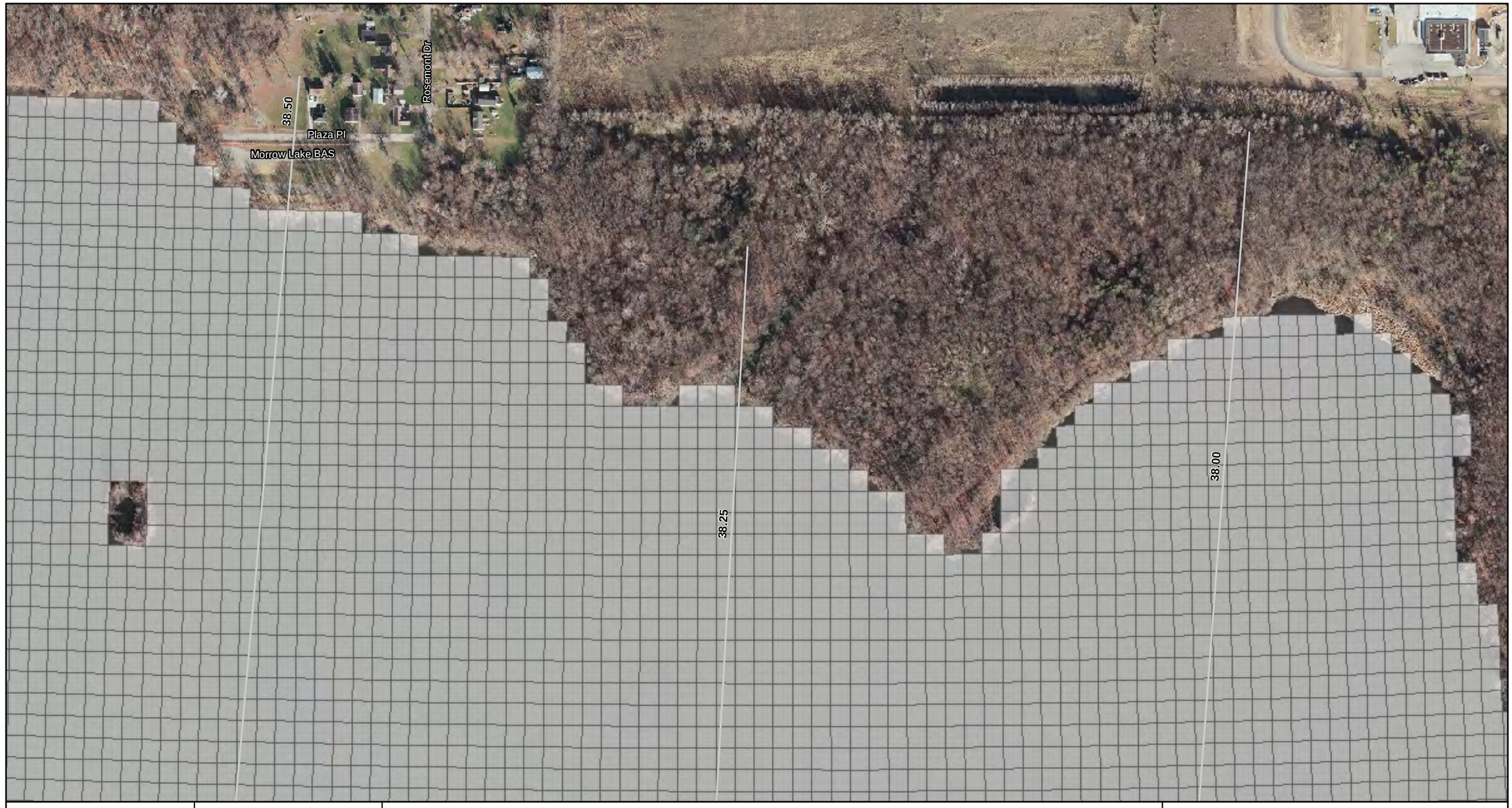
MP 37.55 - MP 38.30

SHEET 49 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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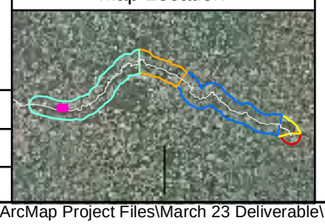
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 37.80 - MP 38.60N

SHEET 50 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

38.50

38.25

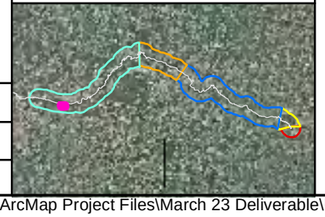
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Lyth Rd

ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 37.80 - MP 38.60S

SHEET 51 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011

39.00

38.75

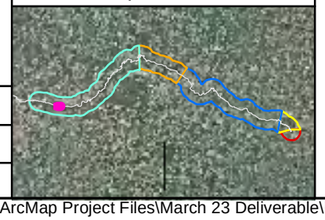
38.50

38.25

ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 38.25 - MP 39.00C

SHEET 52 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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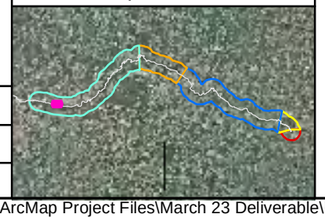
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 38.50 - MP 39.25N

SHEET 53 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 38.50 - MP 39.25S

SHEET 54 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Riverine_Sedimentation_Rate2_Sept_2010.mxd

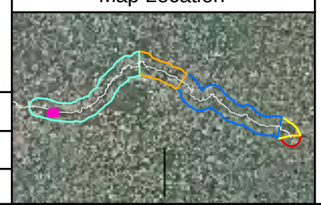
Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 38.90 - MP 39.60S

SHEET 55 OF 56

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
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Aerial Photography Date: November 2011



ENBRIDGE

Drawn:	BRS	4/2/2012
Approved:	DBR	4/2/2012
Project #:	106-4186	

Map Location



Legend

Sedimentation Rate (mm/week)

Cells with Net Change in Silt or Clay Mass

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

Quarter Mile Grid Segment

N

0 125 250 500

Scale in Feet

RIVERINE GRID: SEDIMENTATION RATE
CELLS WITH NET CHANGE IN SILT OR CLAY MASS
SEPTEMBER 8 - SEPTEMBER 15, 2010

MP 39.15 - MP 39.85

SHEET 56 OF 56

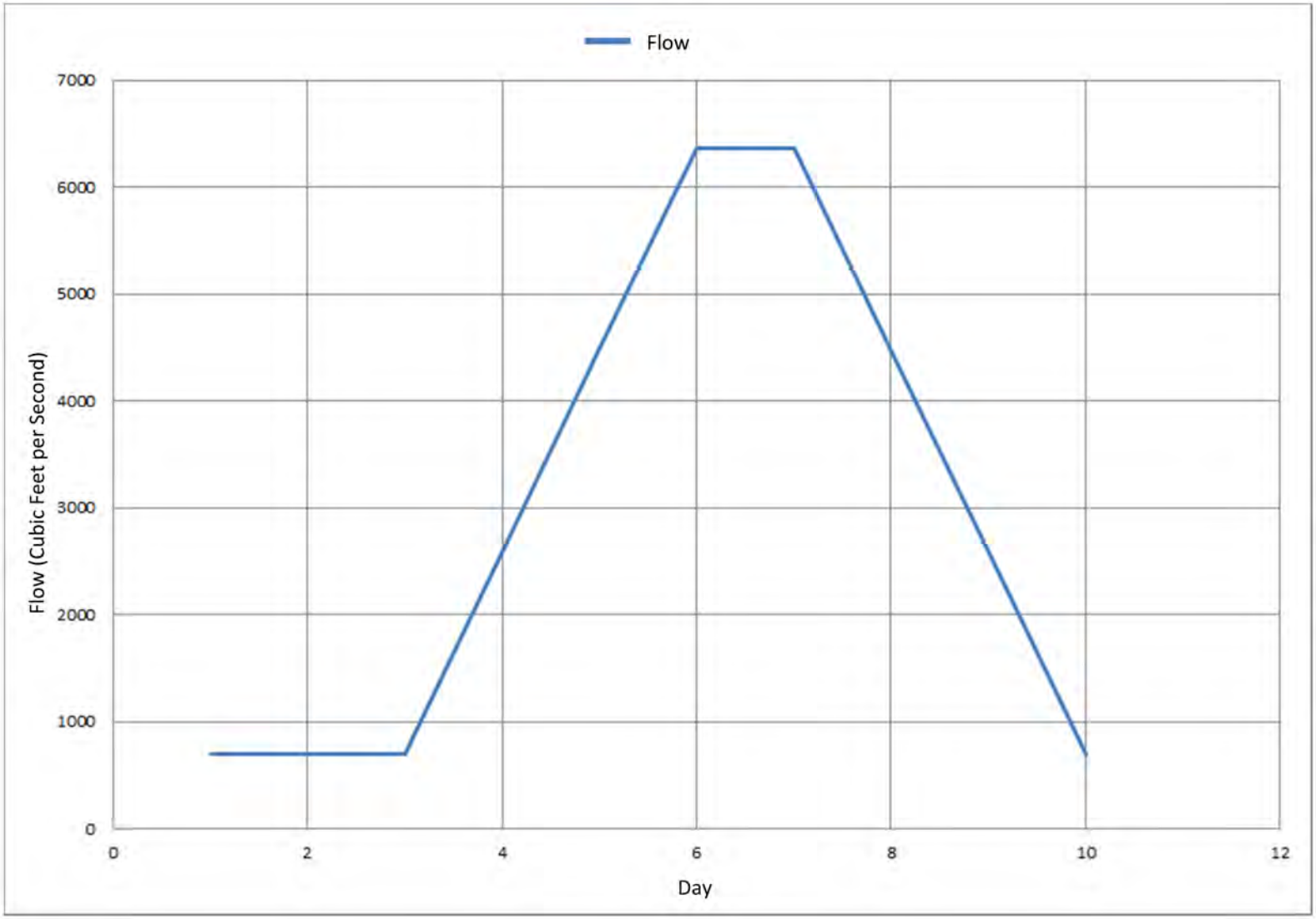
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
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Aerial Photography Date: November 2011

Figure 6-11

100-Year Flow at Kalamazoo River Near Battle Creek



ENBRIDGE

Drawn:	MB	4/18/2012
Approved:	CM	4/18/2012
Project #:	106-4186	

100-YEAR FLOW AT KALAMAZOO RIVER NEAR BATTLE CREEK

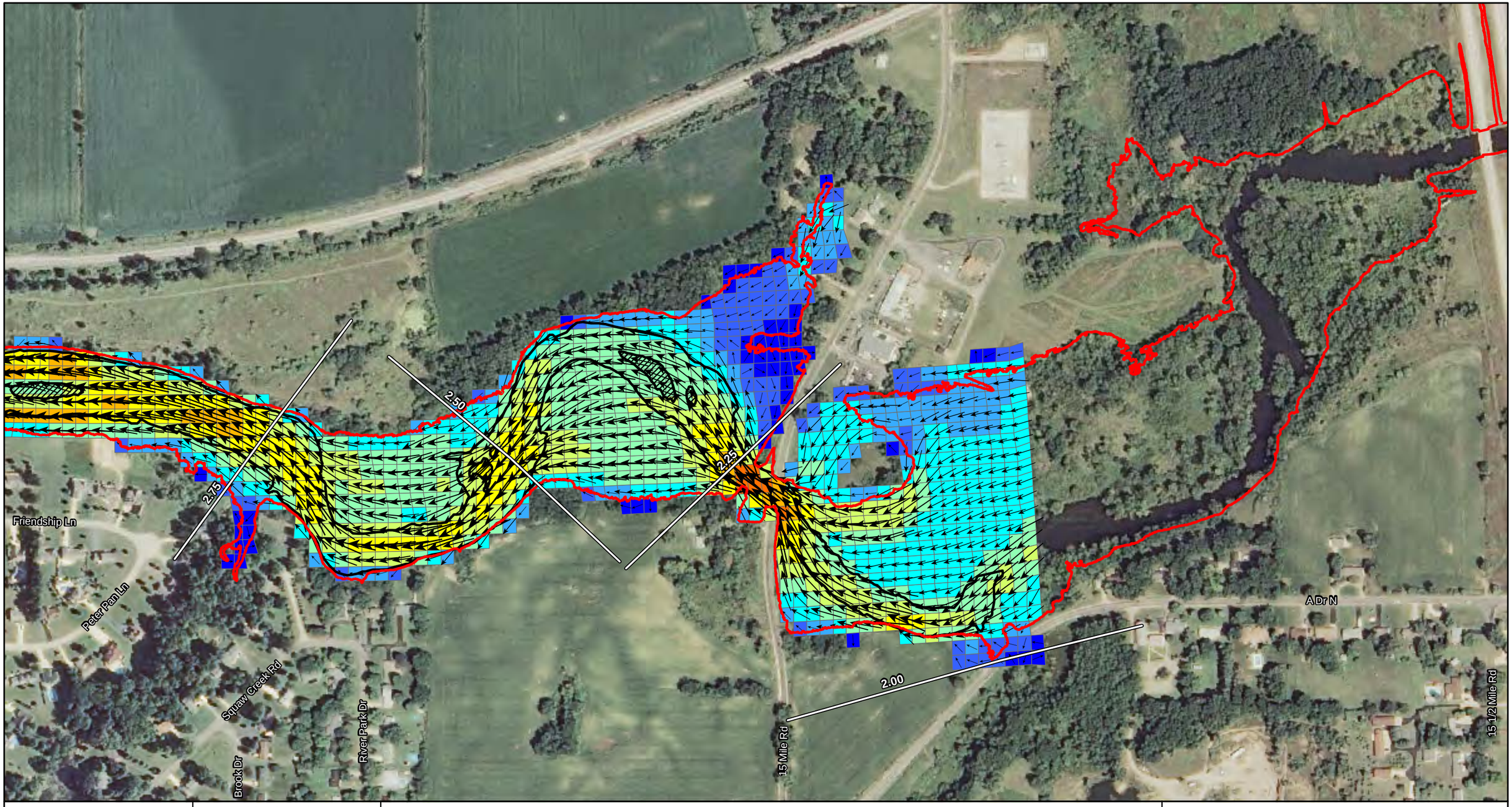
ENBRIDGE LINE 6B MP 608
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Figure 6-12

Floodplain Grid: Velocity

100-Year Flood

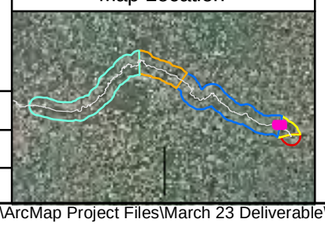
Sheets 1 through 45



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Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

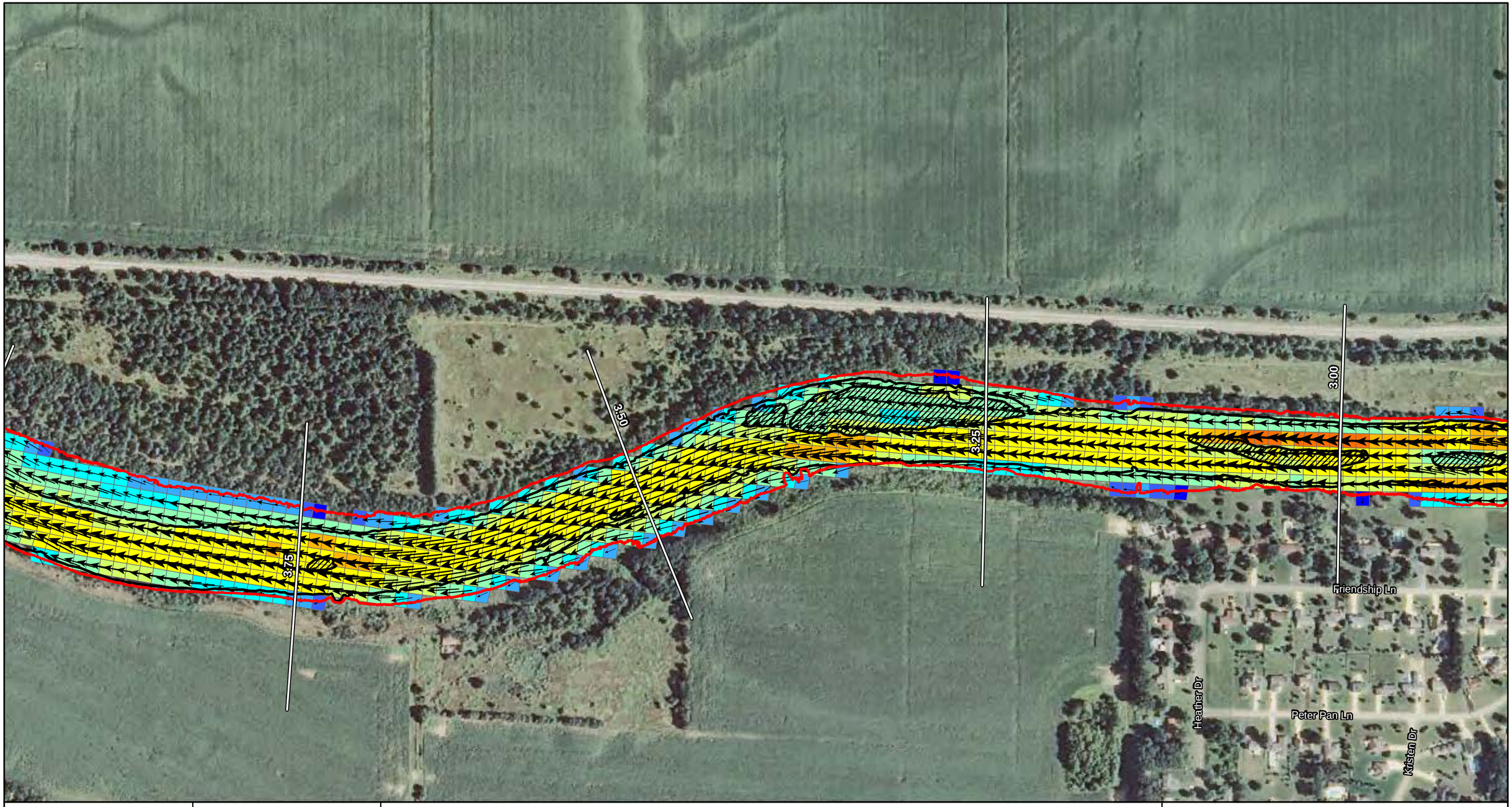
MP 01.88 - MP 02.91

SHEET 1 OF 45

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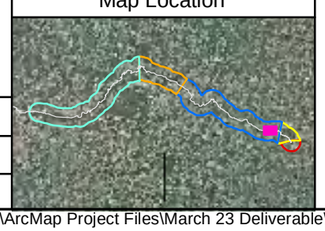
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

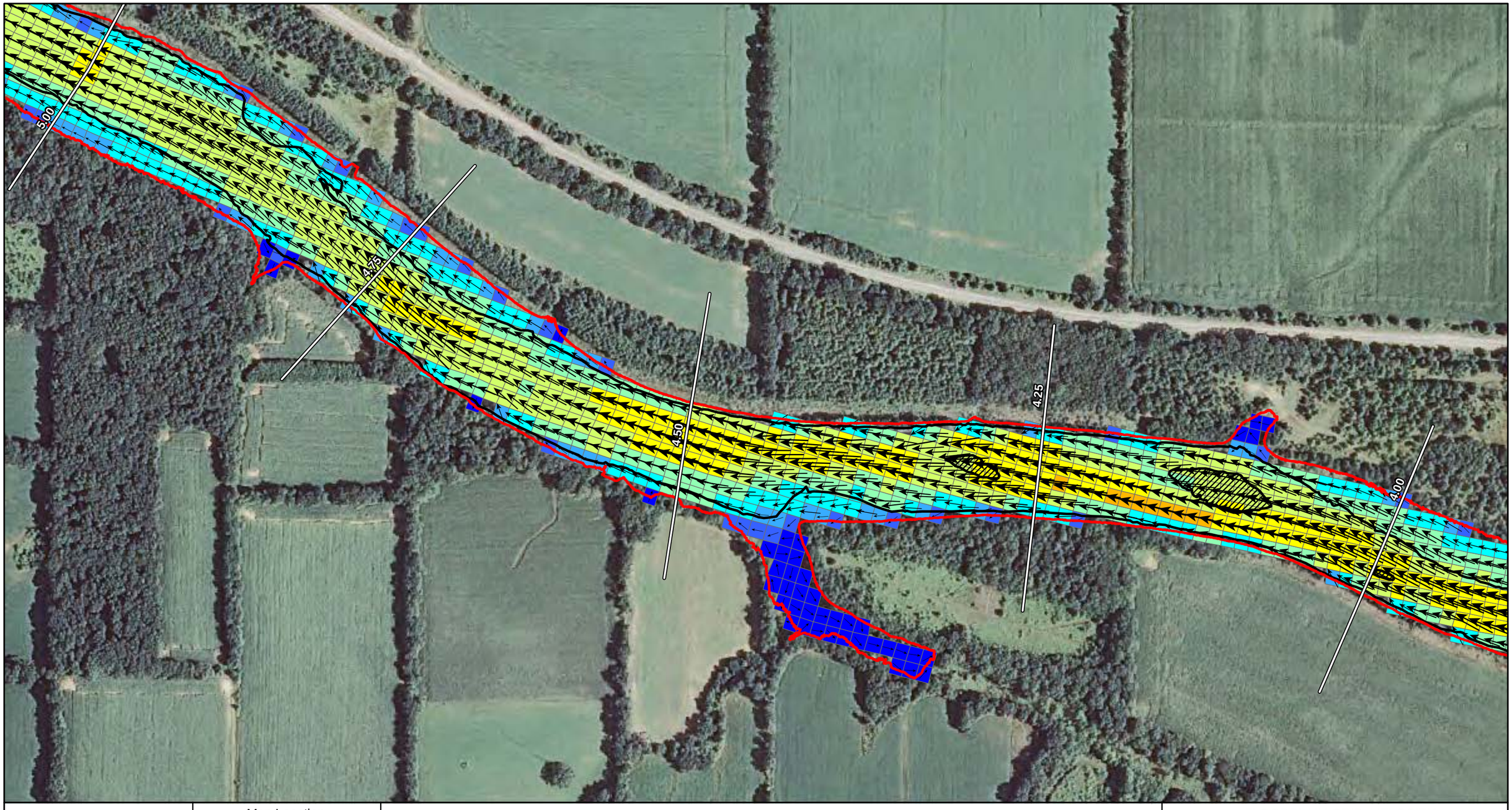
MP 02.91 - MP 03.93

SHEET 2 OF 45

ENBRIDGE LINE 6B MP 608
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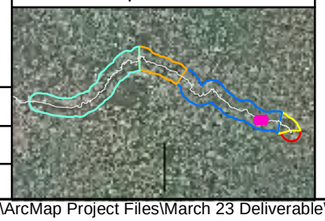
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

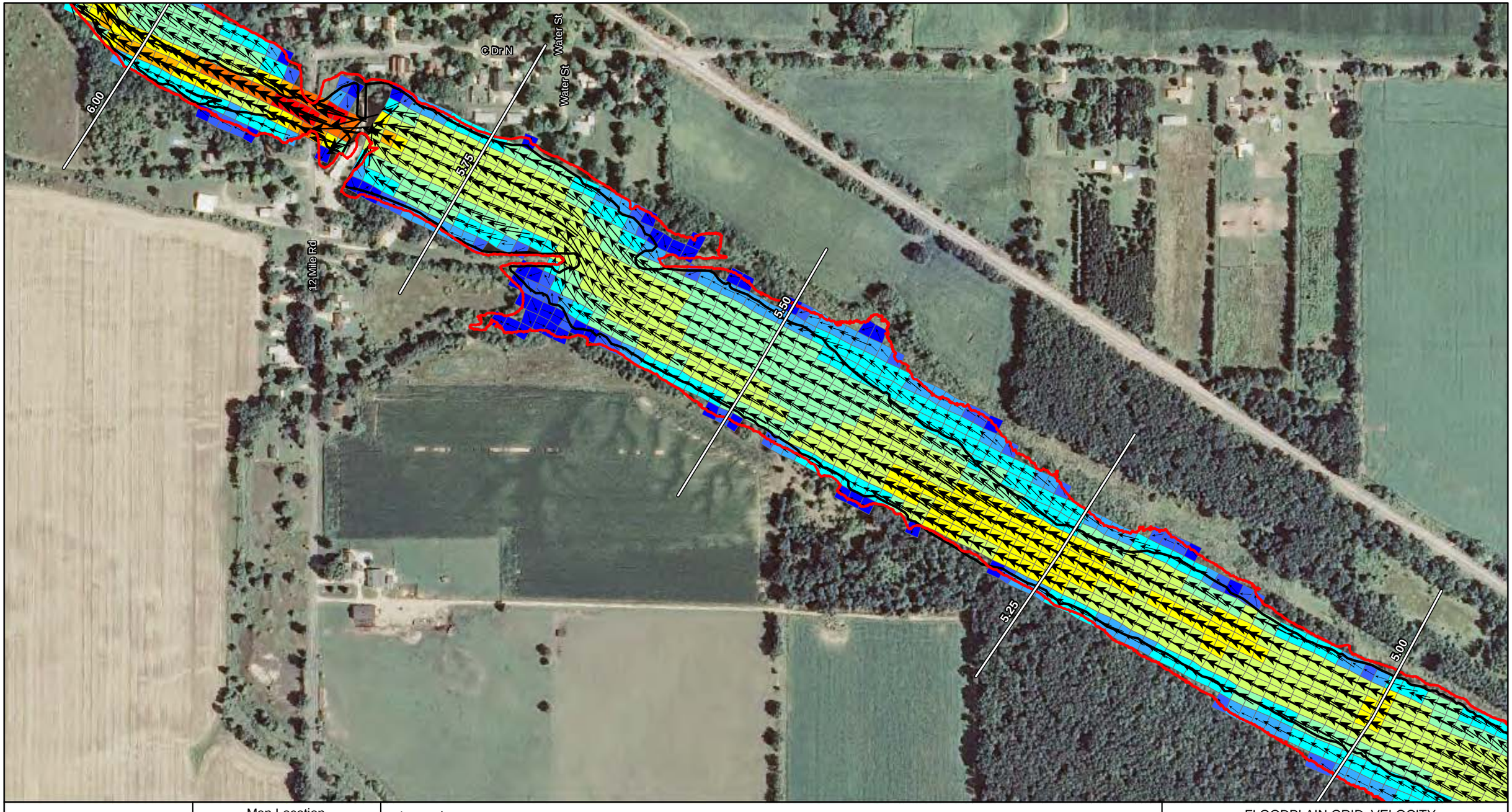
MP 03.93 - MP 04.98

SHEET 3 OF 45

ENBRIDGE LINE 6B MP 608
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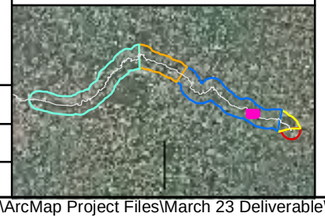
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

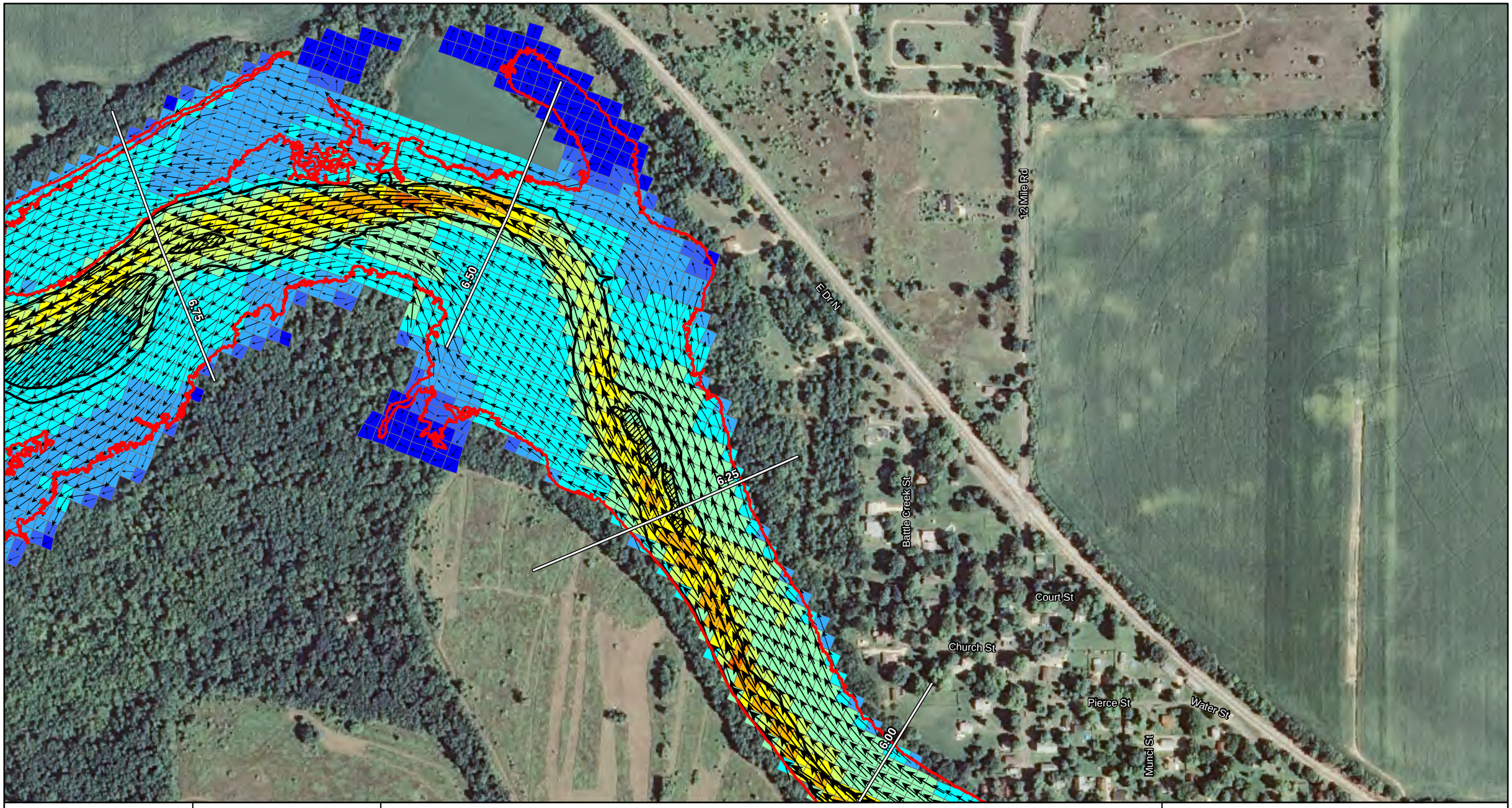
MP 04.98 - MP 06.03

SHEET 4 OF 45

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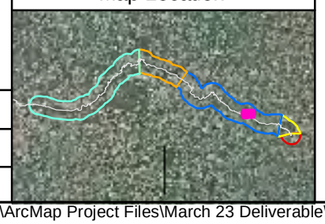
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

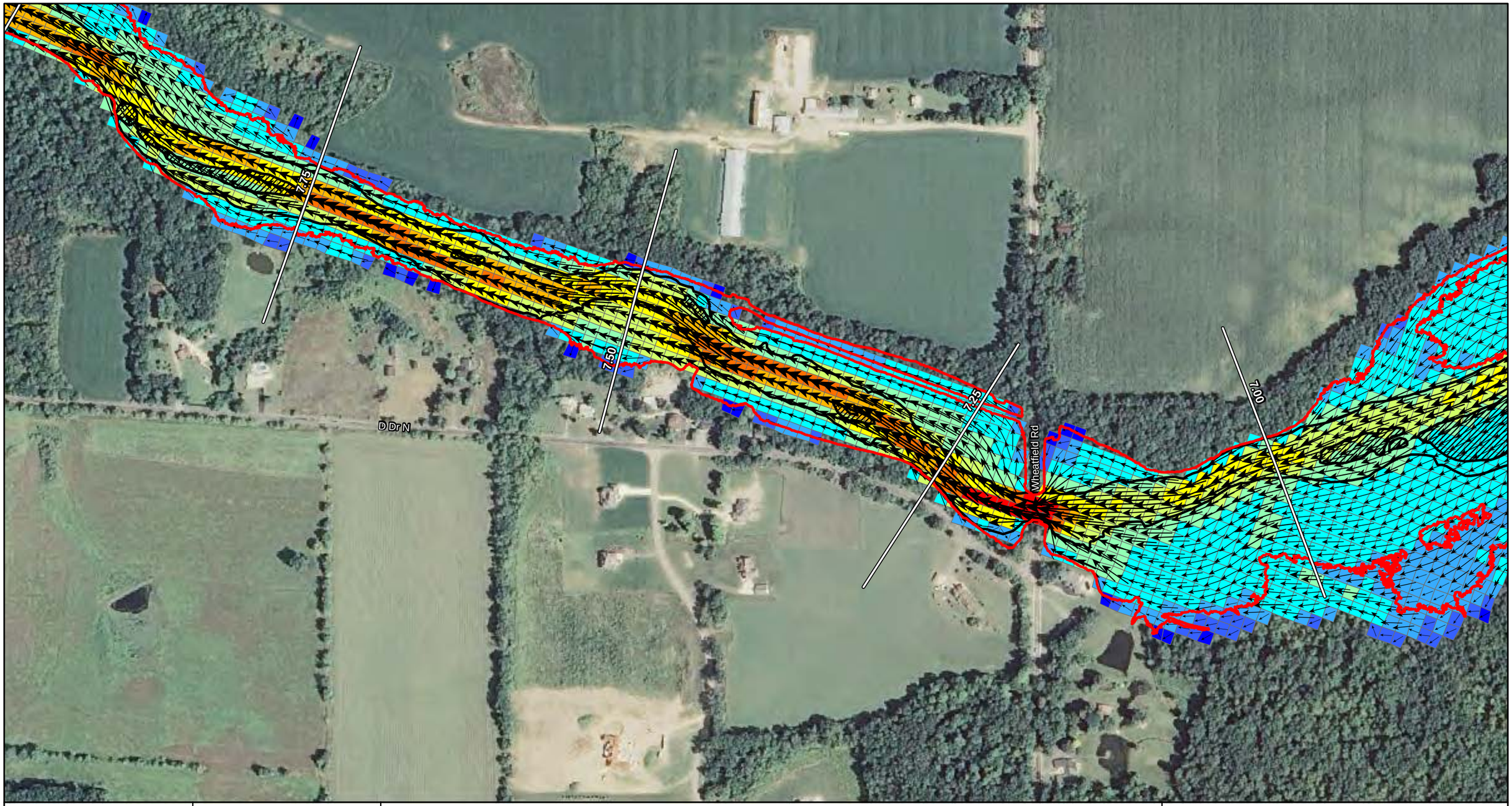
MP 06.03 - MP 06.85

SHEET 5 OF 45

ENBRIDGE LINE 6B MP 608
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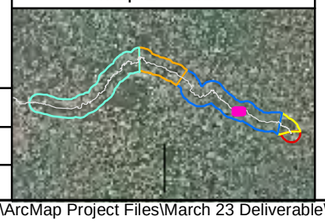
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

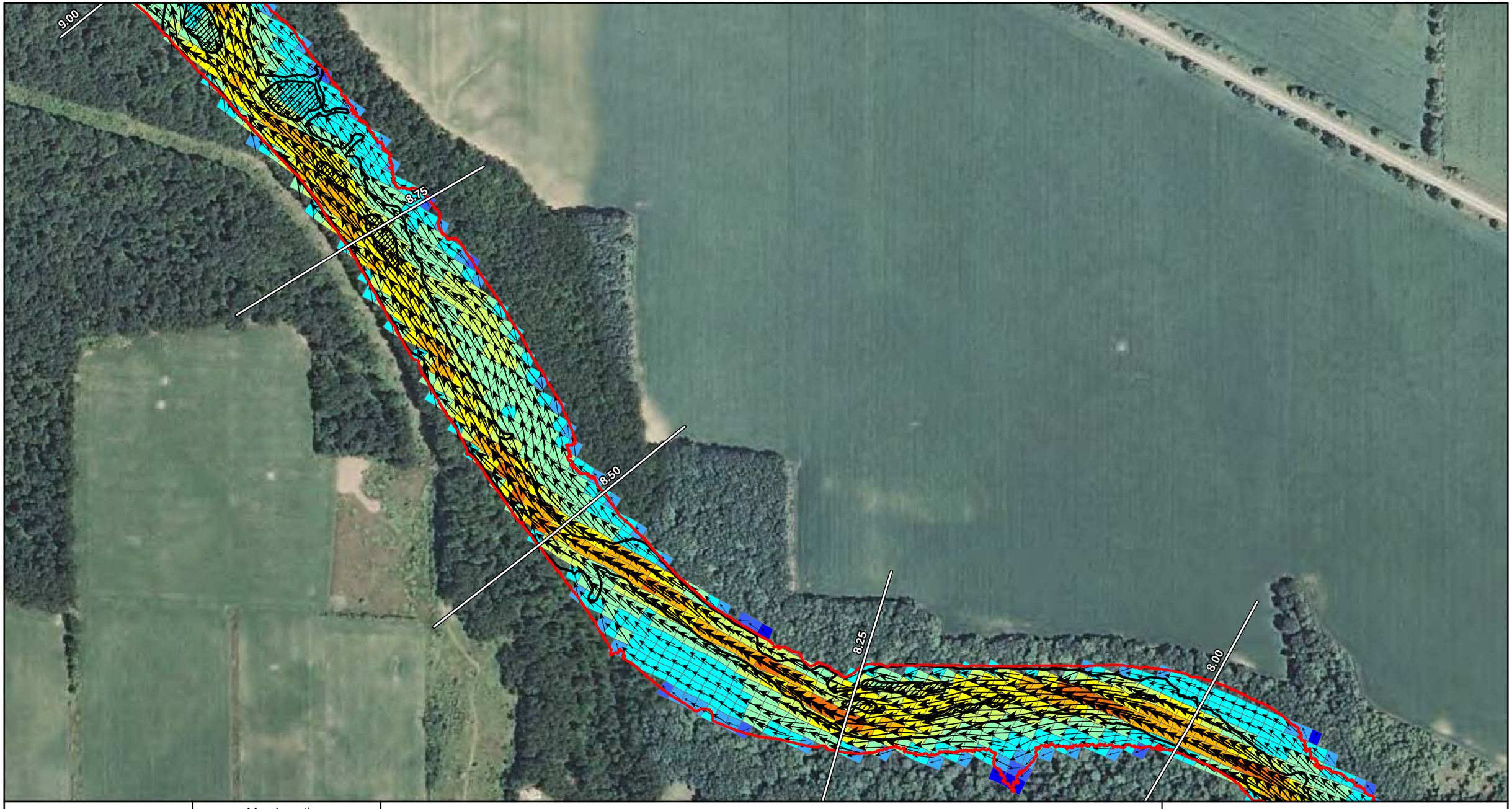
MP 06.85 - MP 07.95

SHEET 6 OF 45

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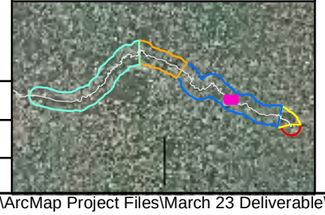
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

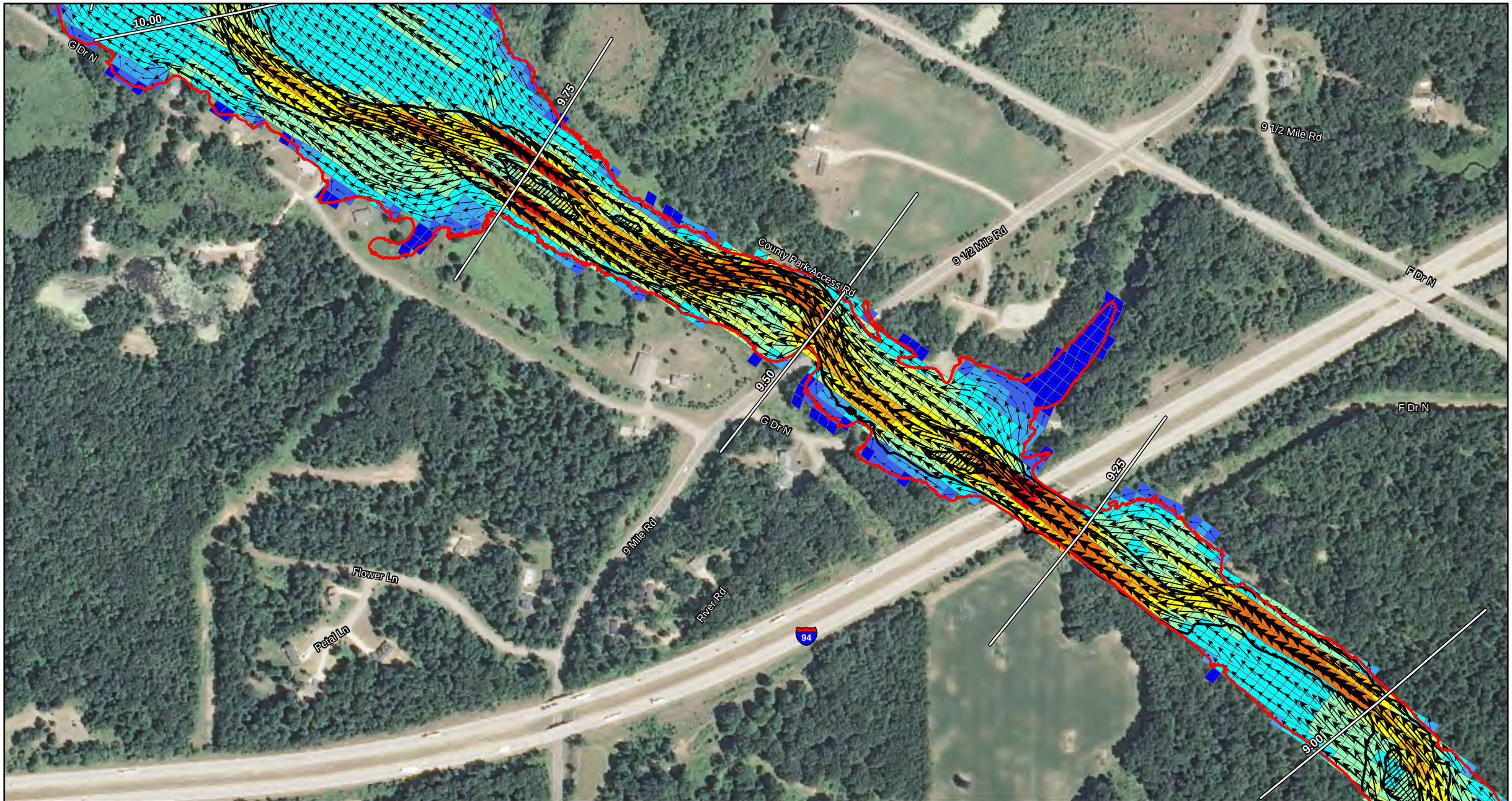
MP 07.95 - MP 08.93

SHEET 7 OF 45

ENBRIDGE LINE 6B MP 608
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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

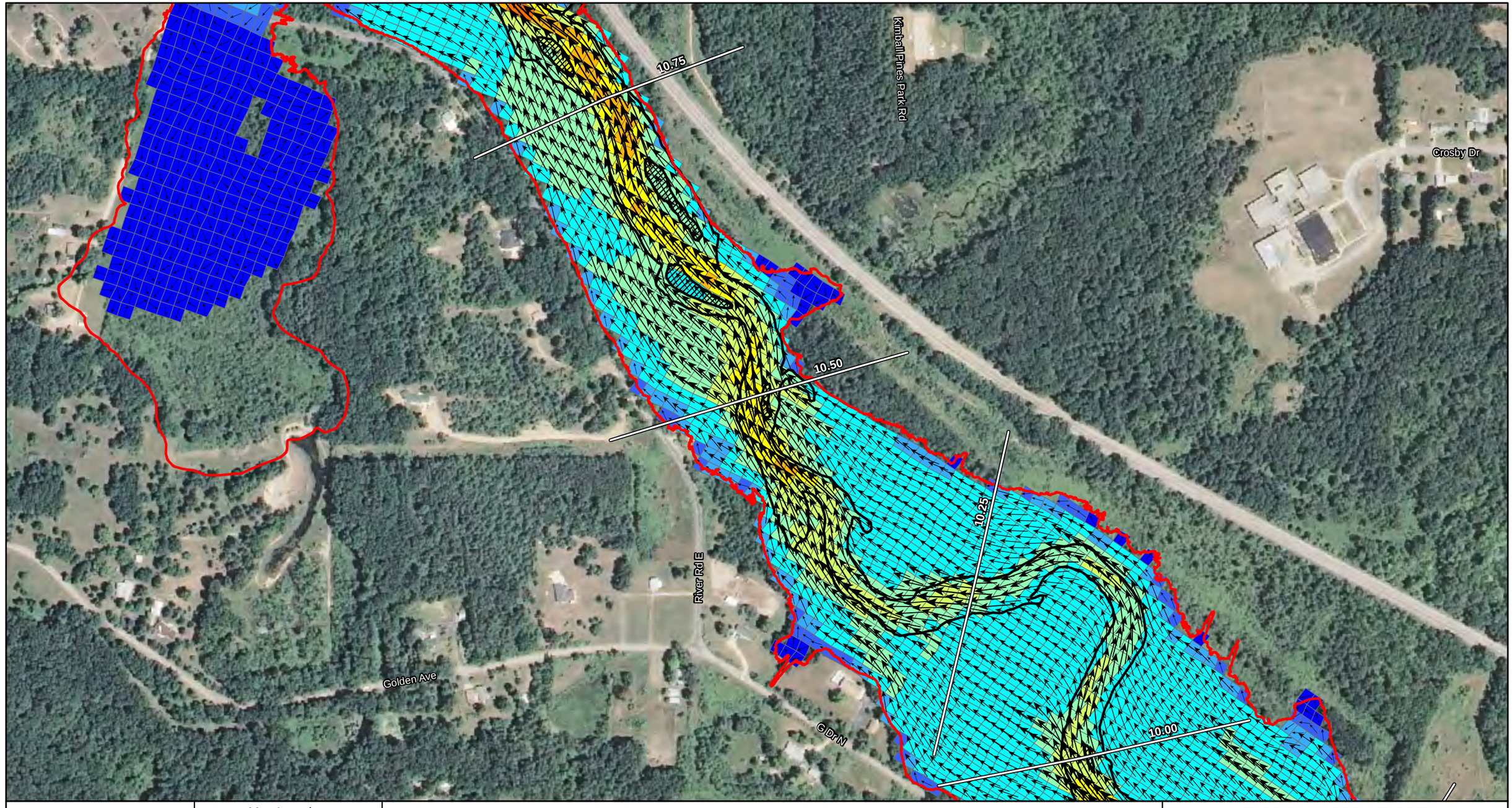
MP 08.93 - MP 10.00

SHEET 8 OF 45

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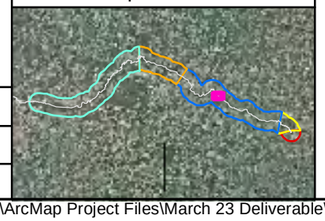
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

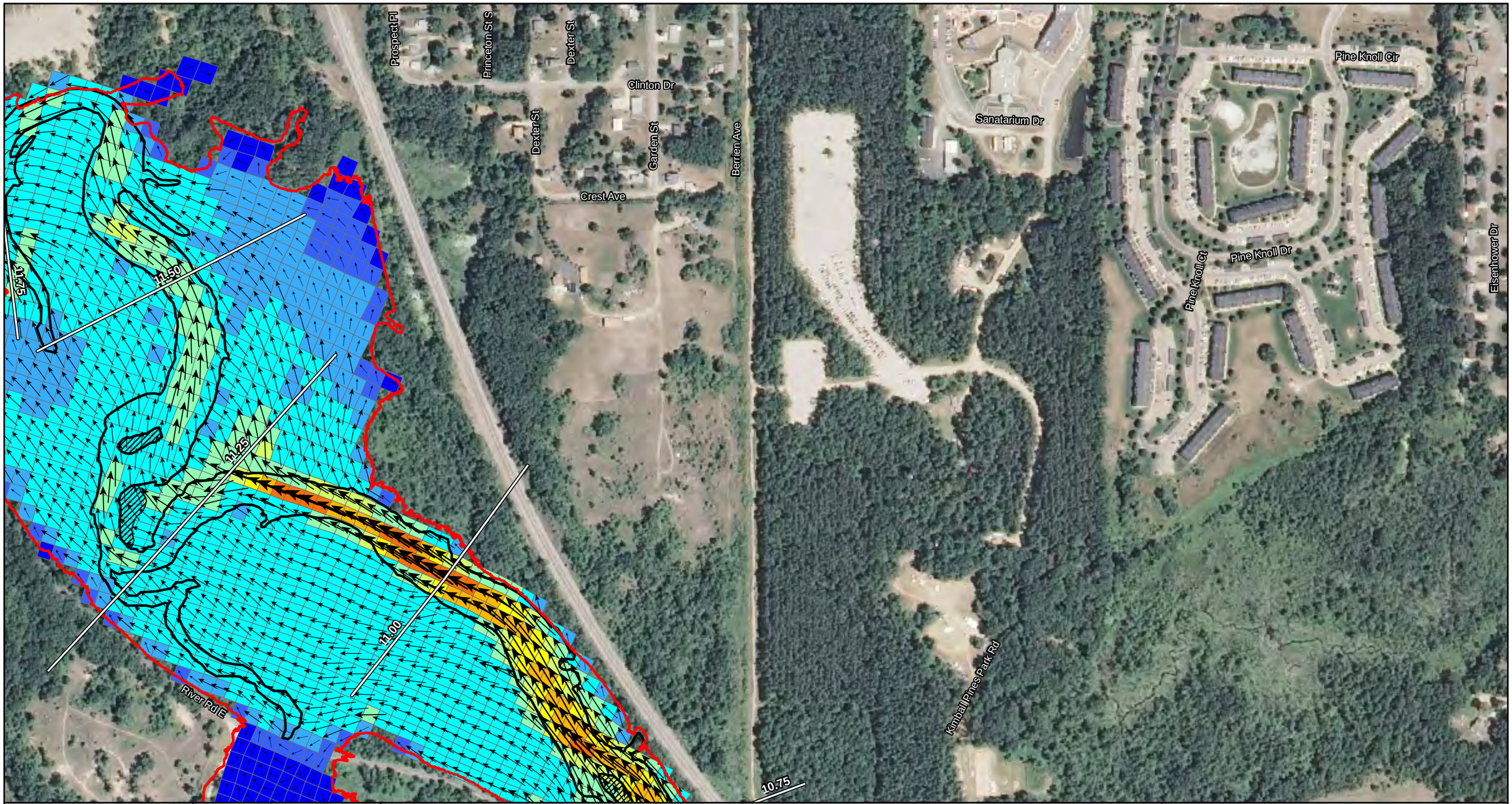
MP 10.00 - MP 10.80

SHEET 9 OF 45

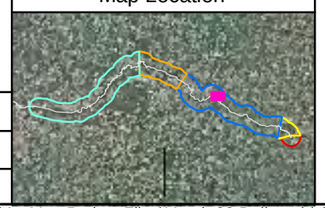
ENBRIDGE LINE 6B MP 608
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Aerial Photography Date: July & August 2009



Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

MP 10.80 - MP 11.70

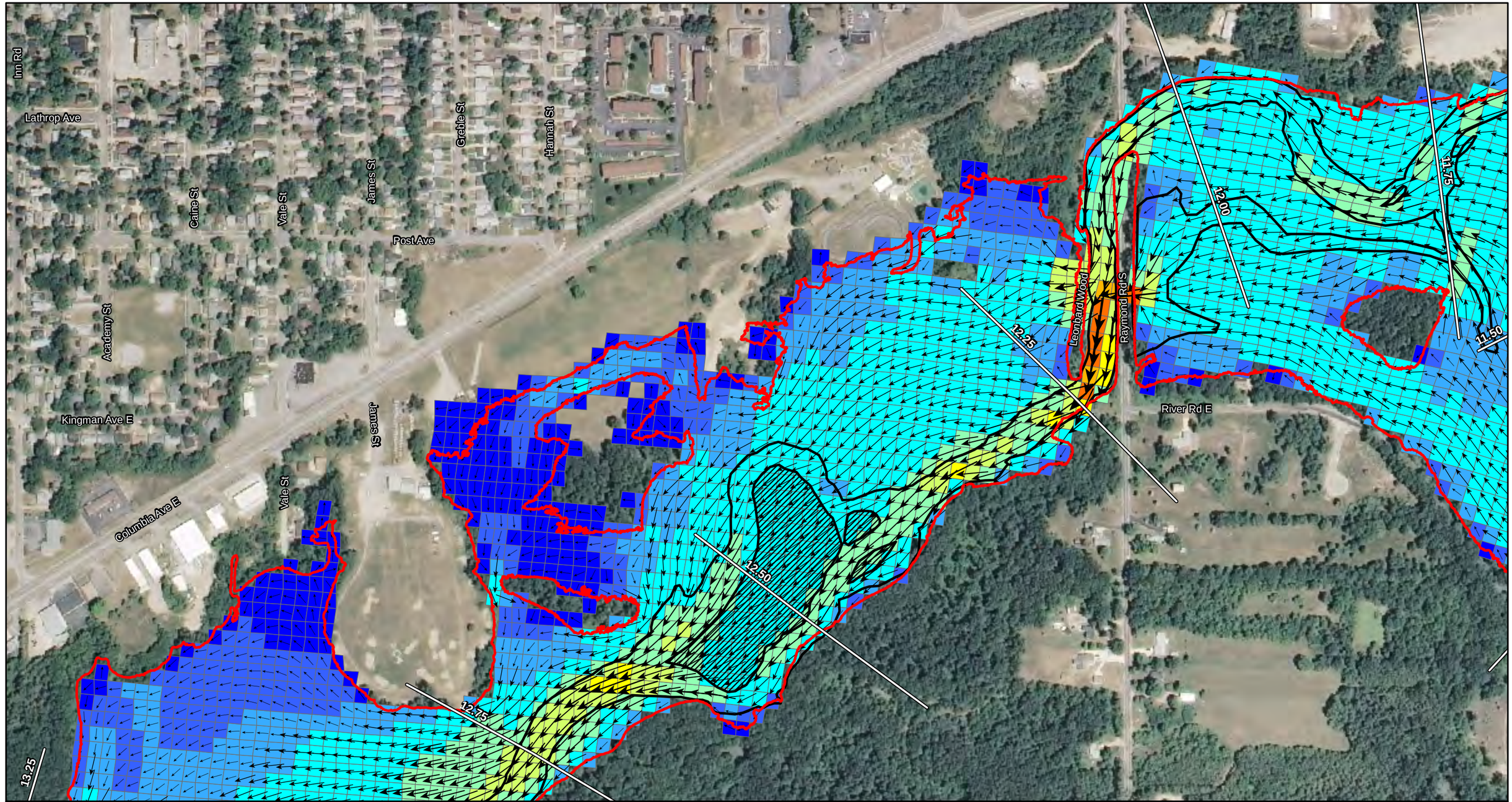
SHEET 10 OF 45

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Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

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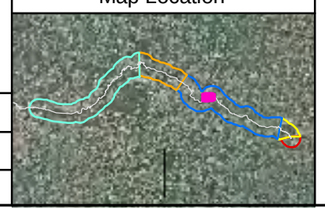
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

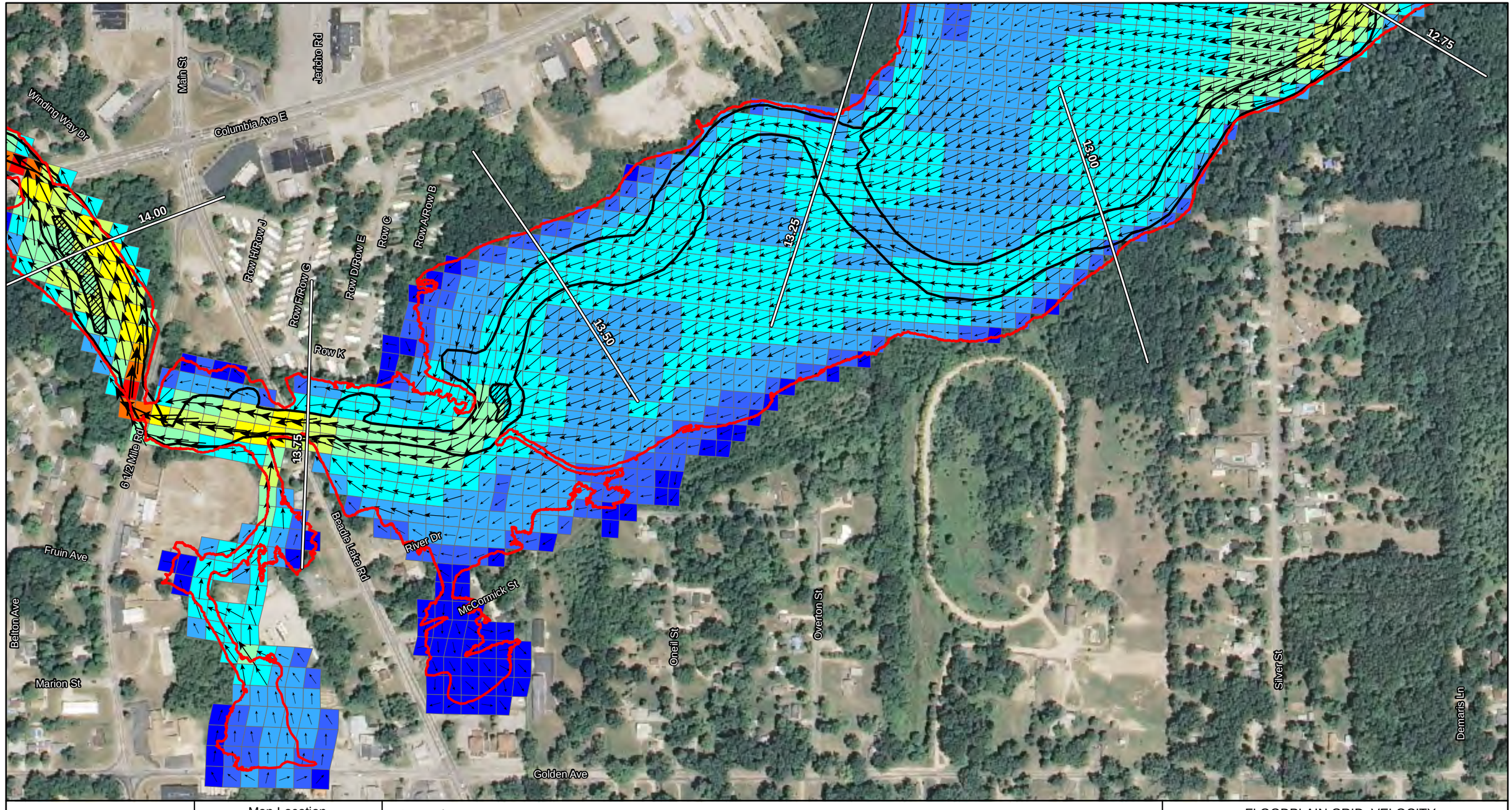
MP 11.70 - MP 12.77

SHEET 11 OF 45

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ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_100yr.mxd

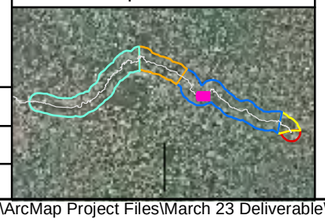
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

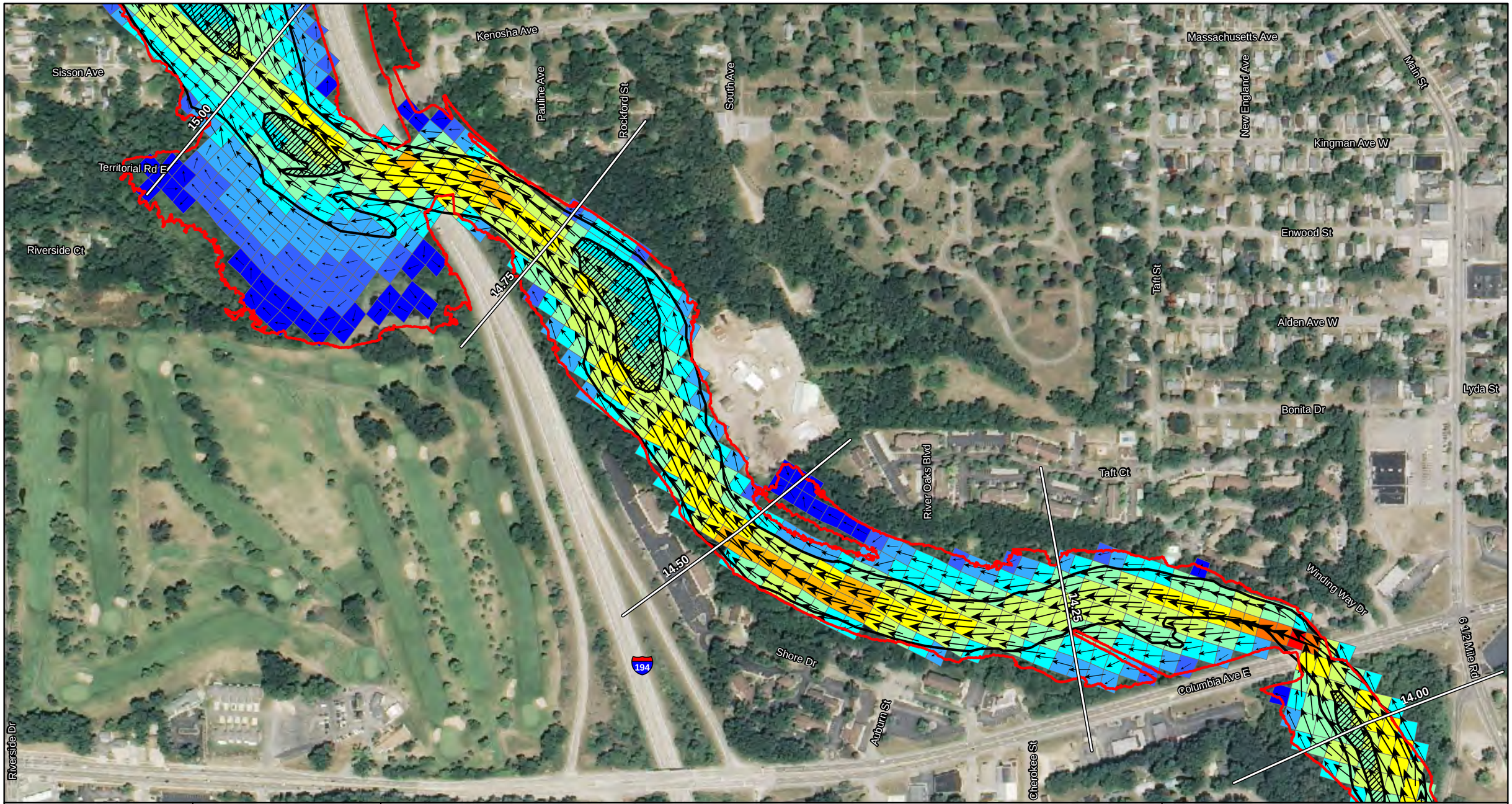
MP 12.77 - MP 14.00

SHEET 12 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_100yr.mxd

Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

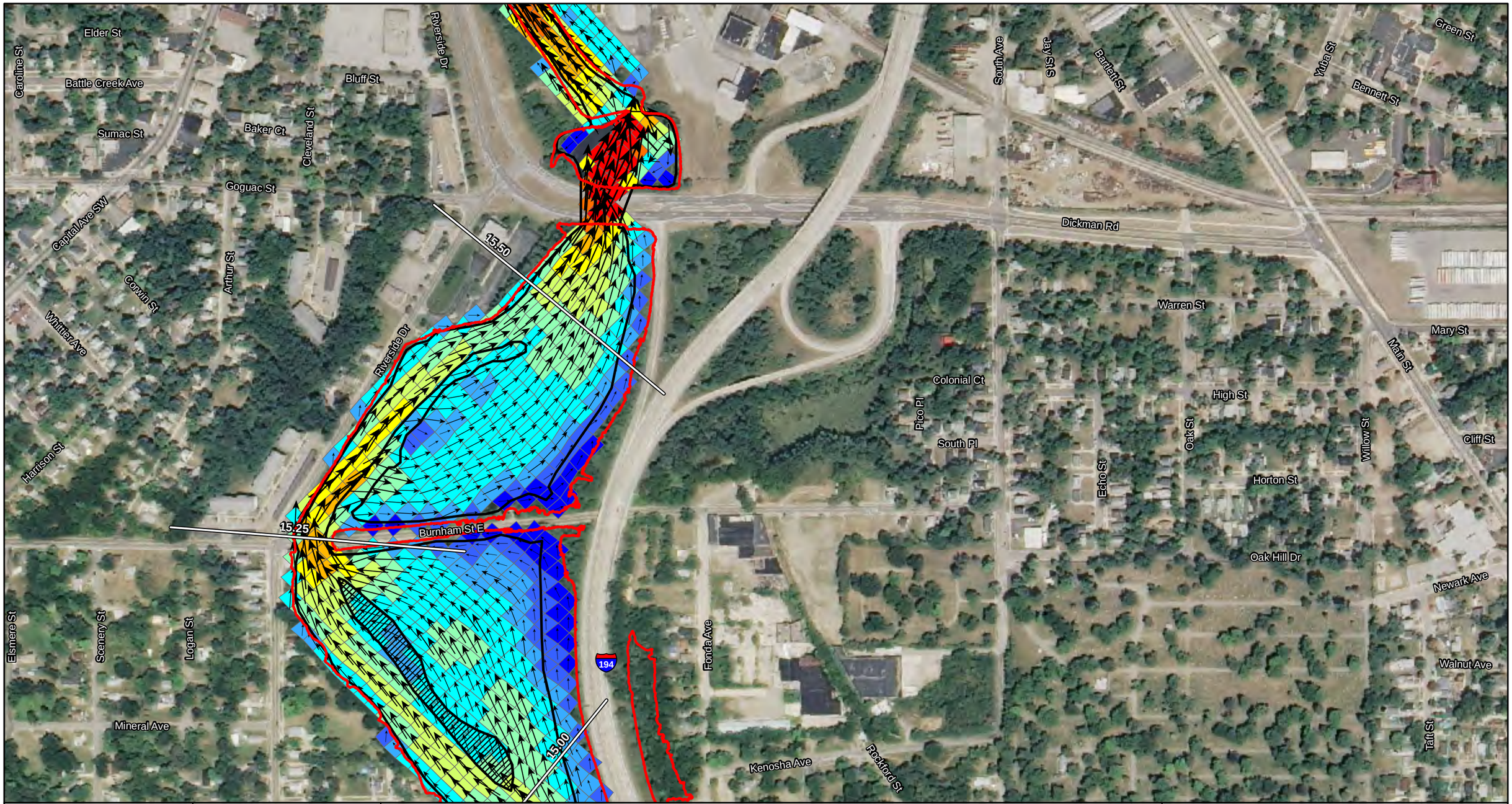
MP 14.00 - MP 15.05

SHEET 13 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_100yr.mxd

Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

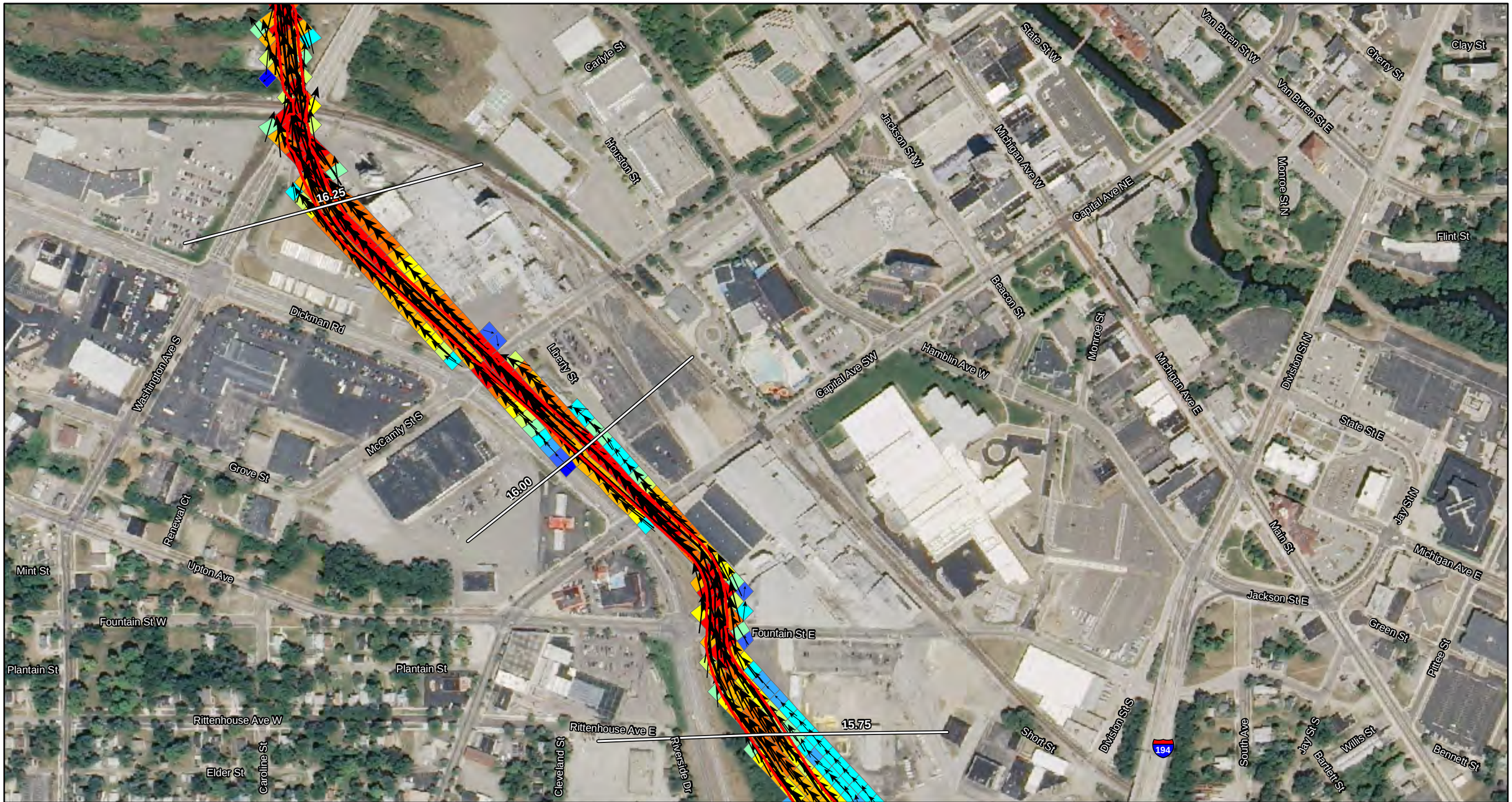
MP 15.05 - MP 15.71

SHEET 14 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

MP 15.71 - MP 16.38

SHEET 15 OF 45

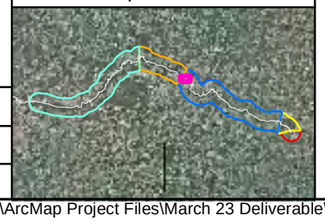
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_100yr.mxd

Aerial Photography Date: July & August 2009



Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

MP 16.38 - MP 17.30

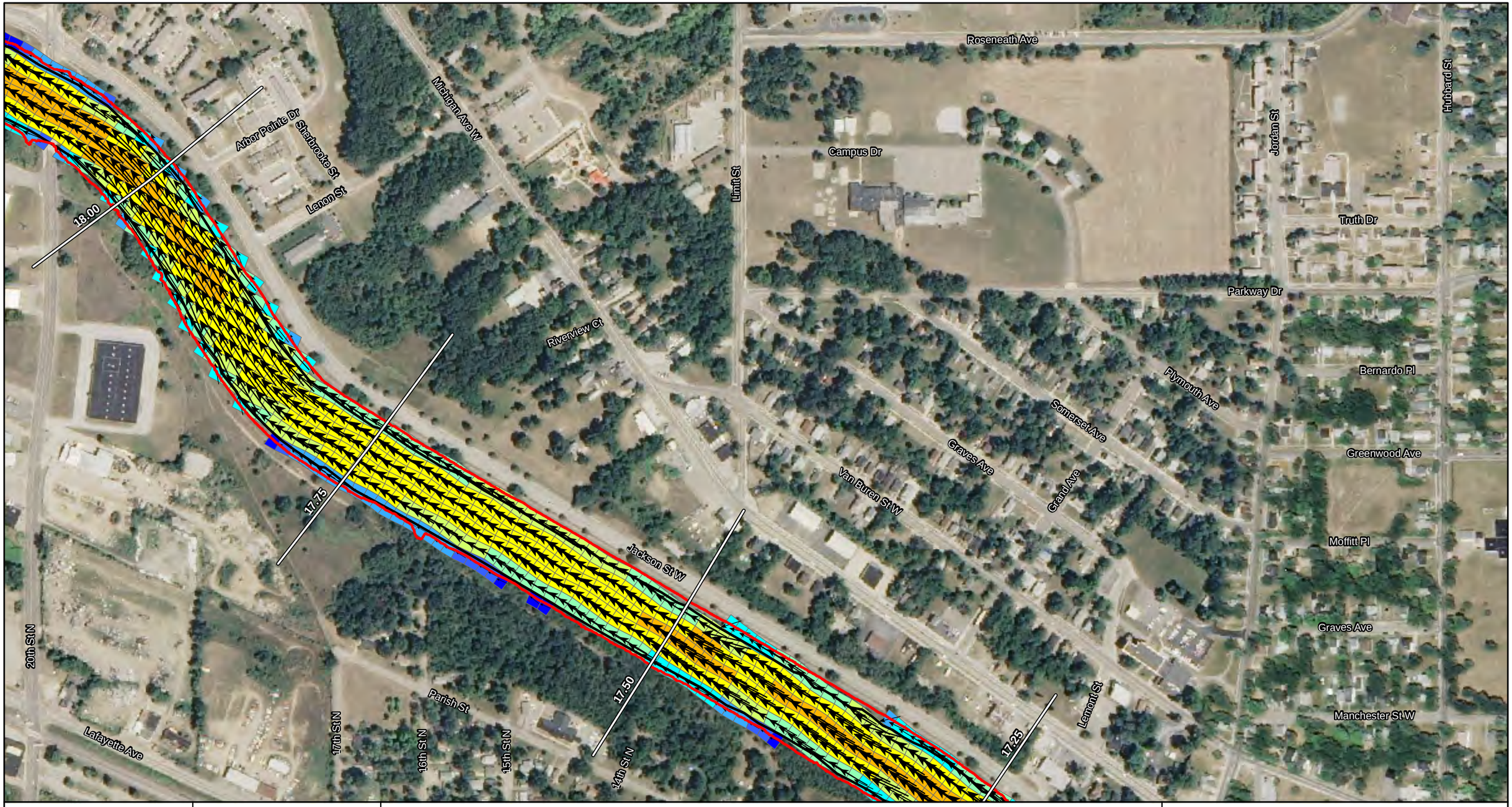
SHEET 16 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

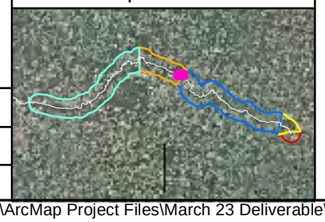
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_100yr.mxd

Aerial Photography Date: July & August 2009



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

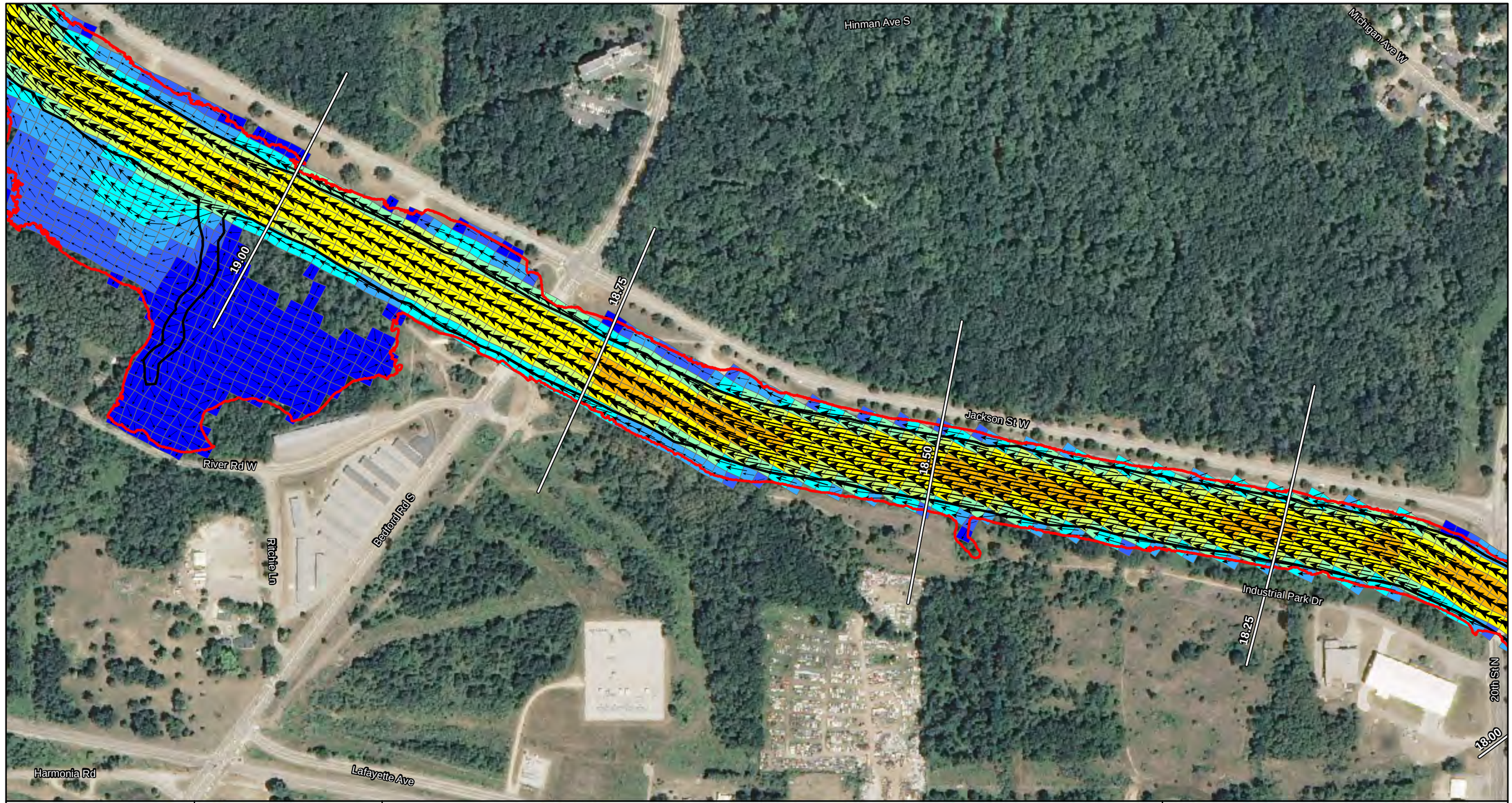
MP 17.30 - MP 18.11

SHEET 17 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

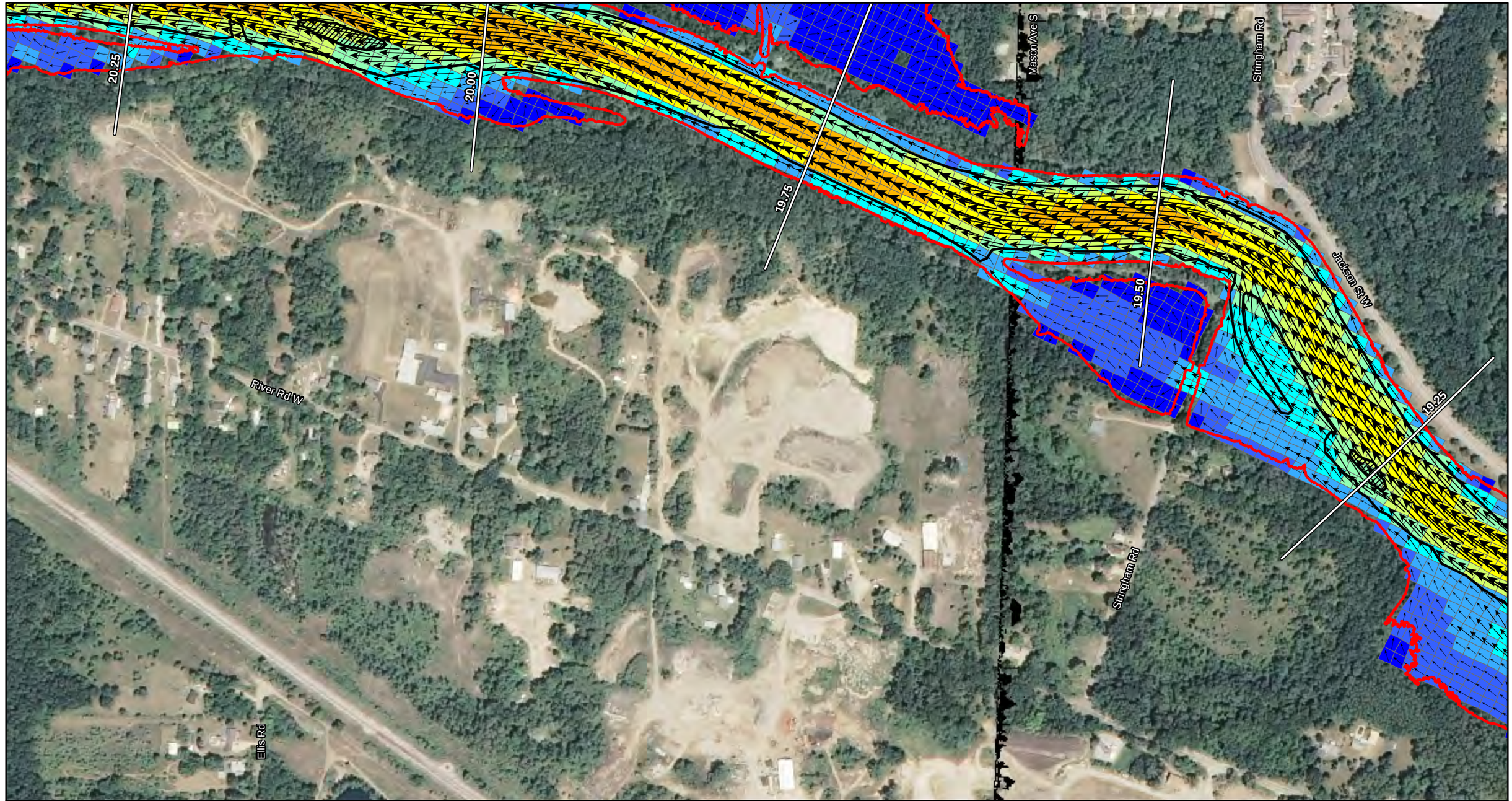
MP 18.11 - MP 19.18

SHEET 18 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

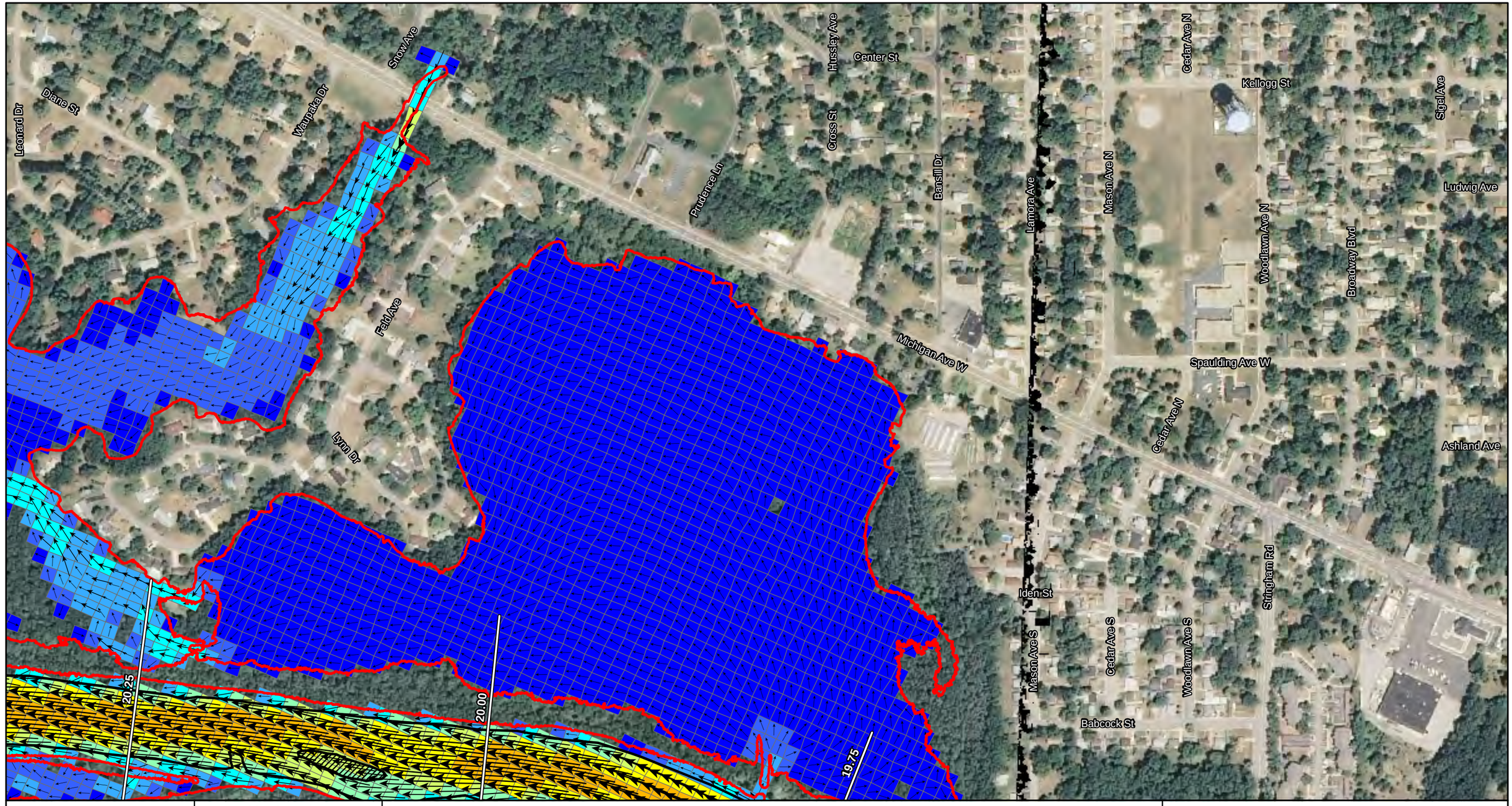
MP 19.18 - MP 20.00

SHEET 19 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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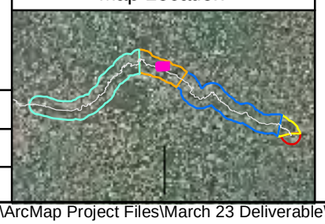
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

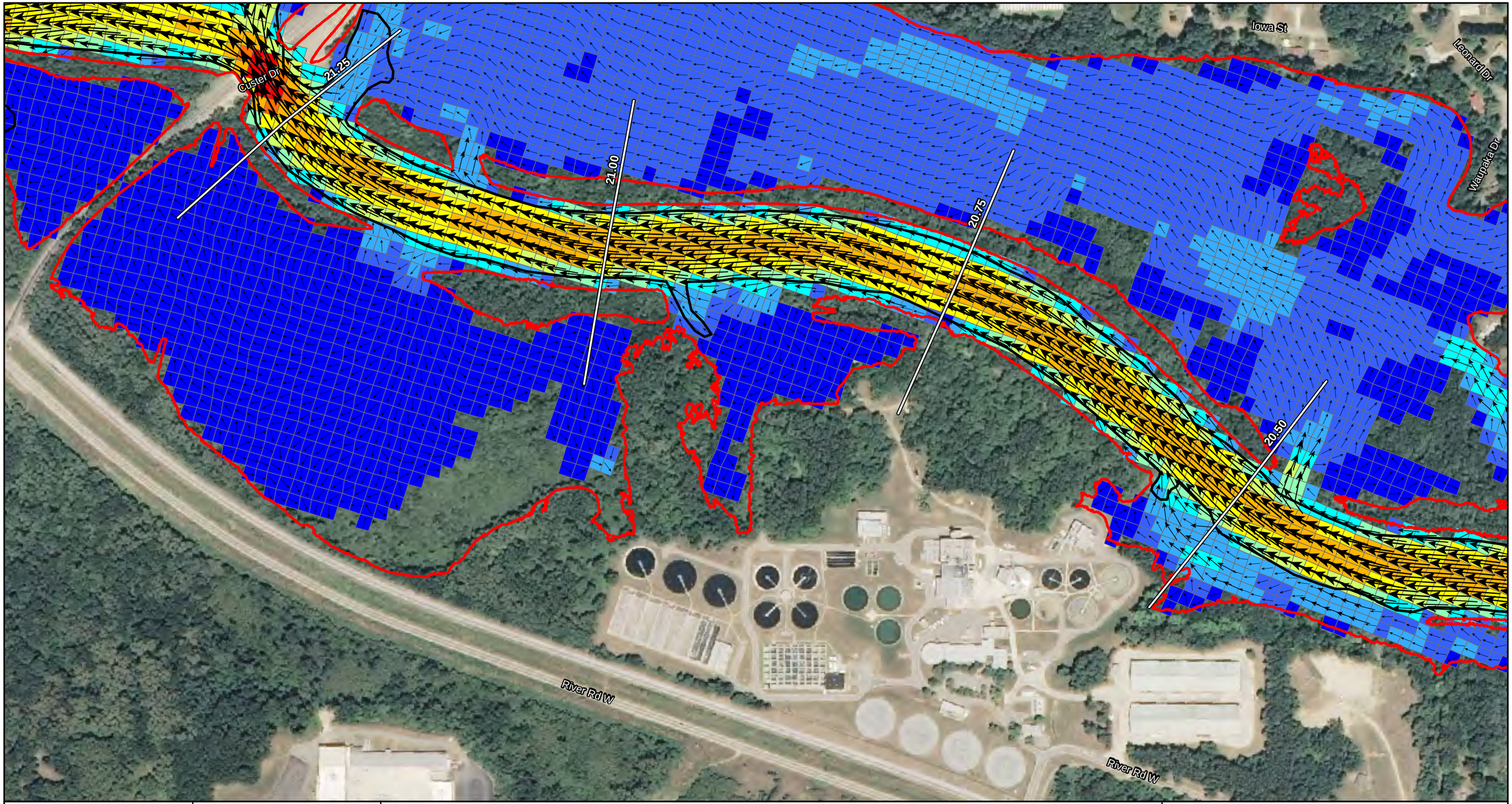
MP 20.00 - MP 20.32

SHEET 20 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

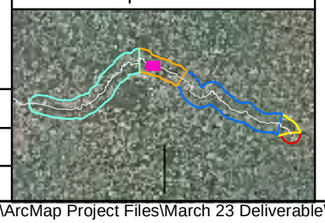
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_100yr.mxd

Aerial Photography Date: July & August 2009



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

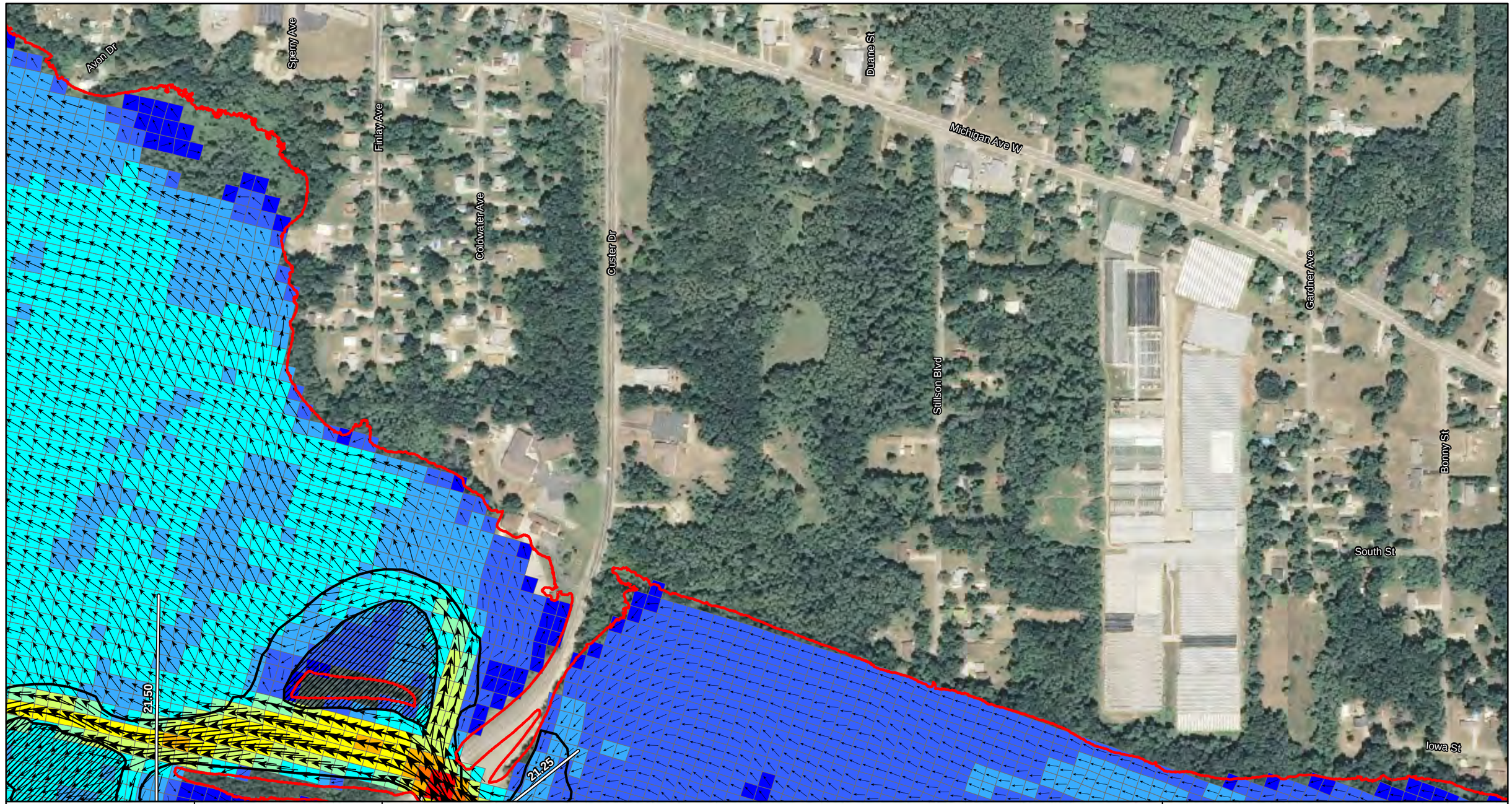
MP 20.32 - MP 21.36

SHEET 21 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_100yr.mxd

Aerial Photography Date: July & August 2009



Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

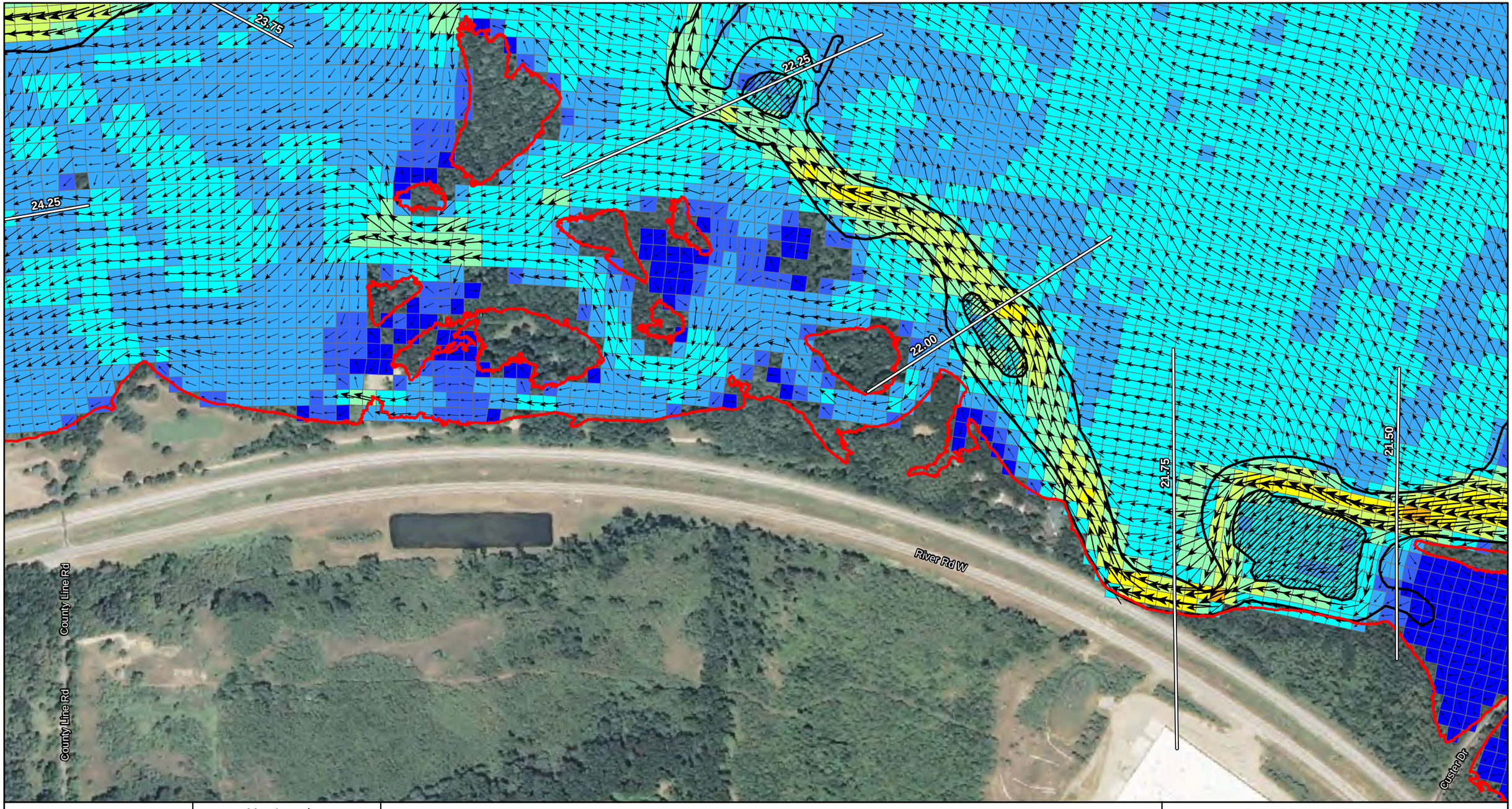
MP 21.36 - MP 21.59

SHEET 22 OF 45

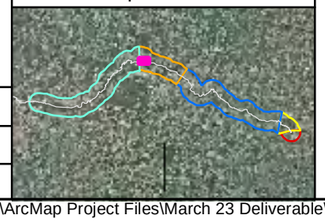
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_100yr.mxd

Aerial Photography Date: July & August 2009



Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

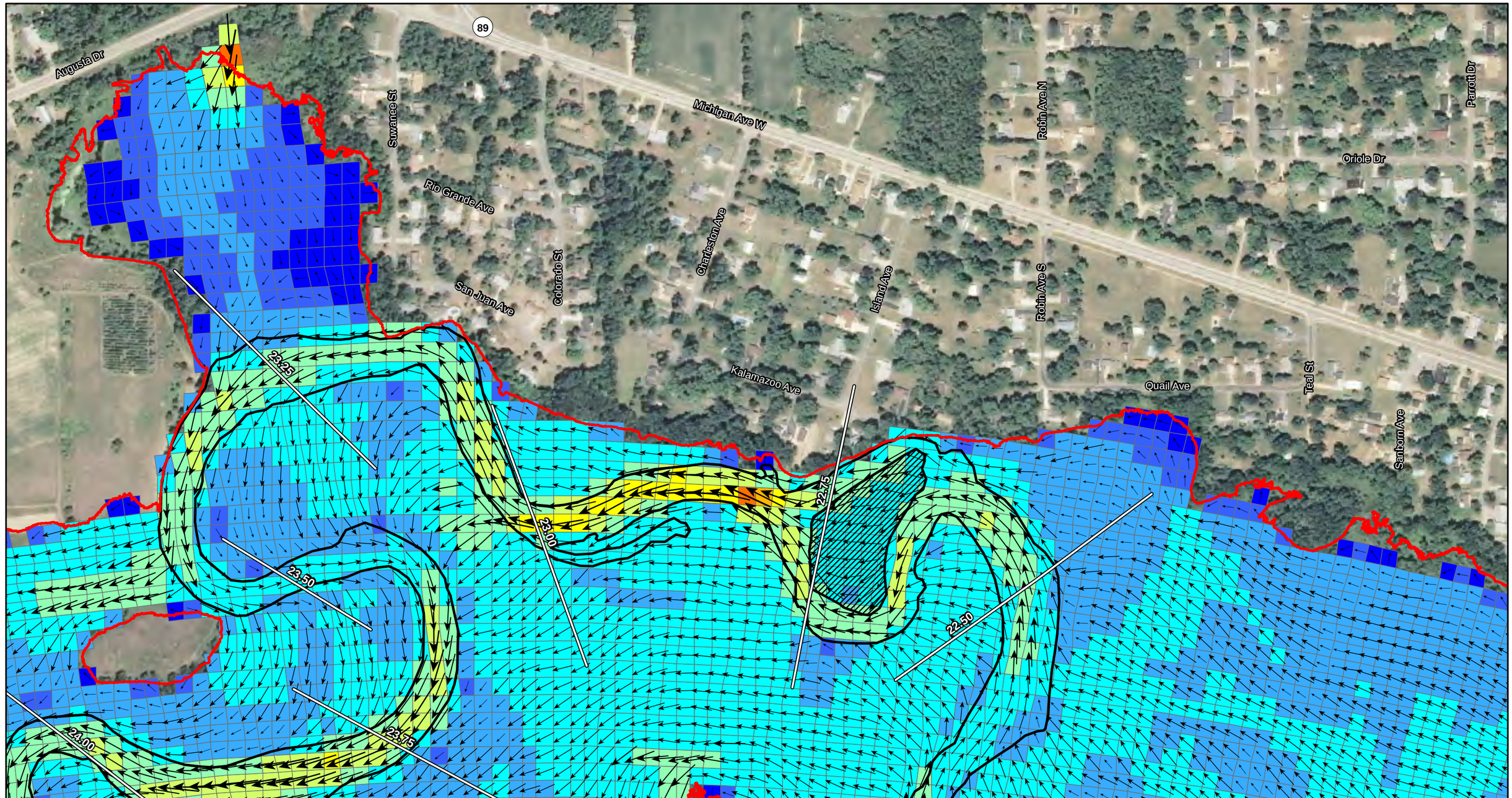
MP 21.59 - MP 22.33

SHEET 23 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

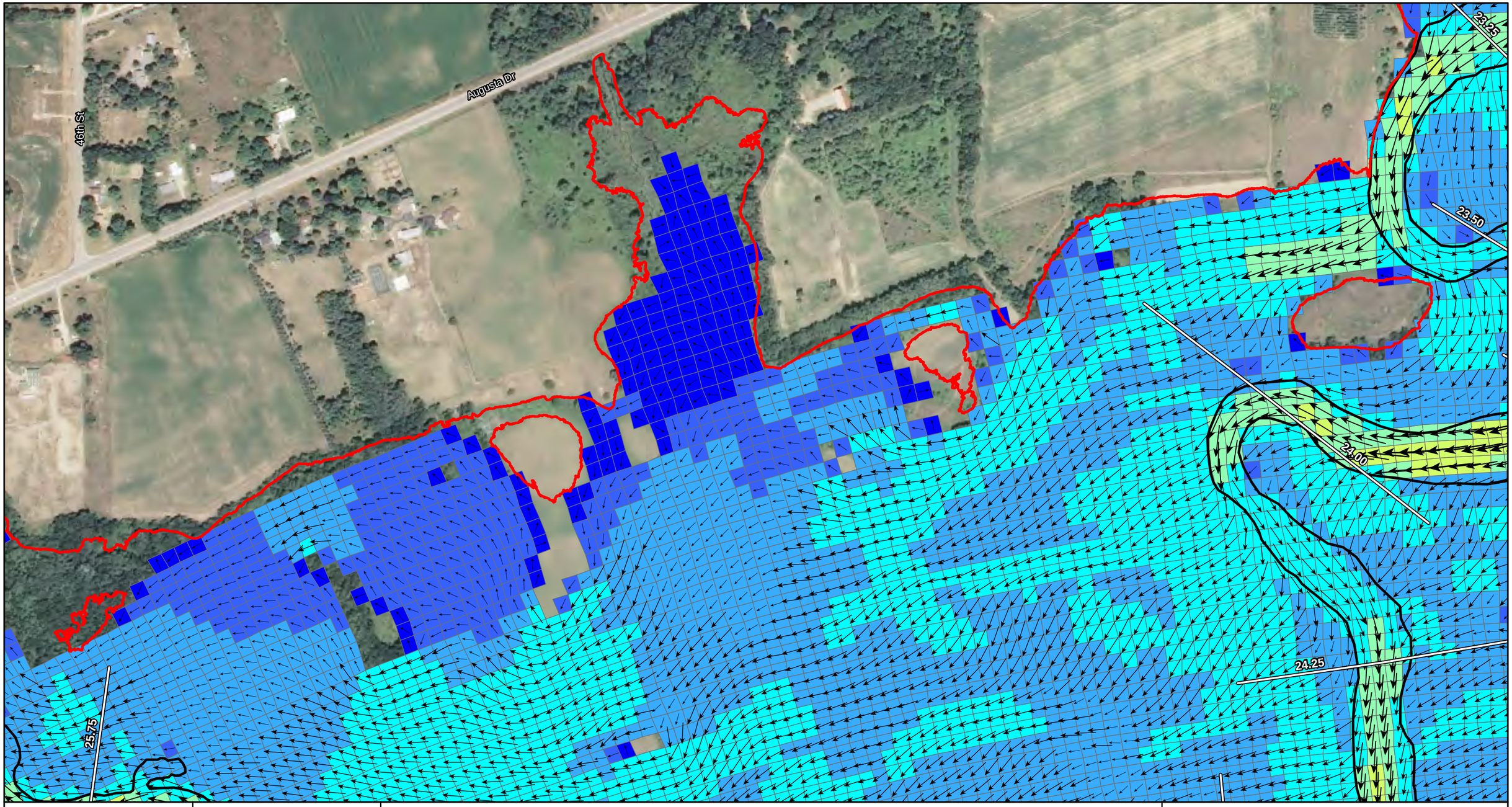
MP 22.33 - MP 24.01

SHEET 24 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_100yr.mxd

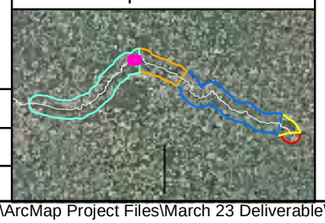
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

MP 24.01 - MP 24.33

SHEET 25 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_100yr.mxd

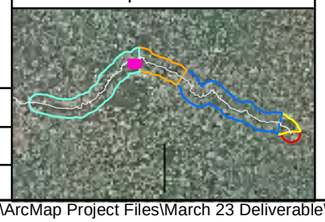
Aerial Photography Date: July & August 2009

25.75
25.50
25.25
25.00
24.75
24.50
Fort Custer Dr

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

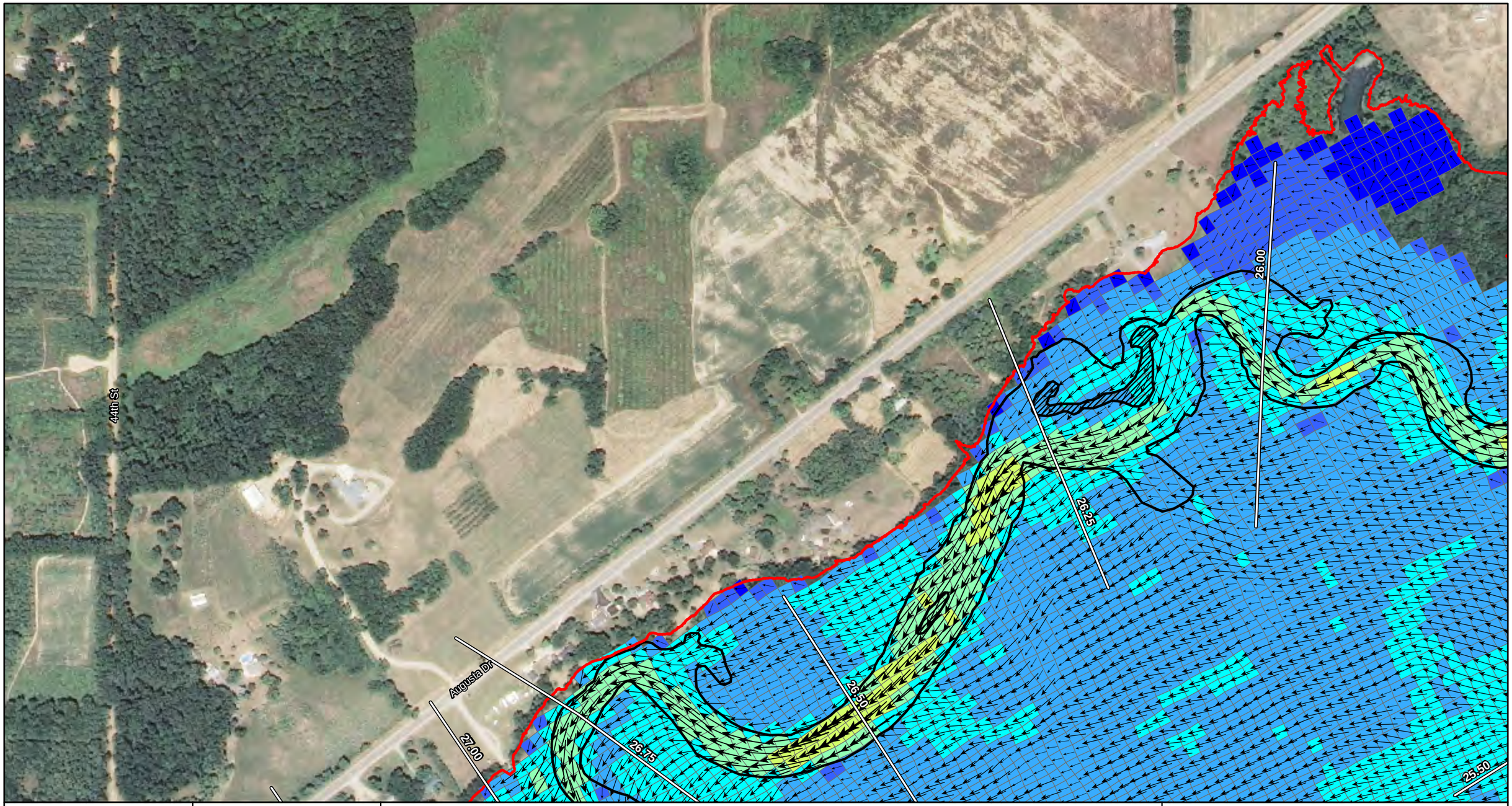
MP 24.33 - MP 25.79

SHEET 26 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_100yr.mxd

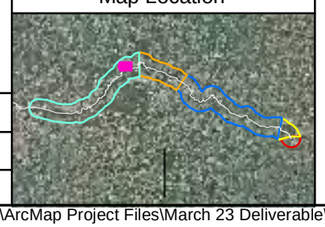
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

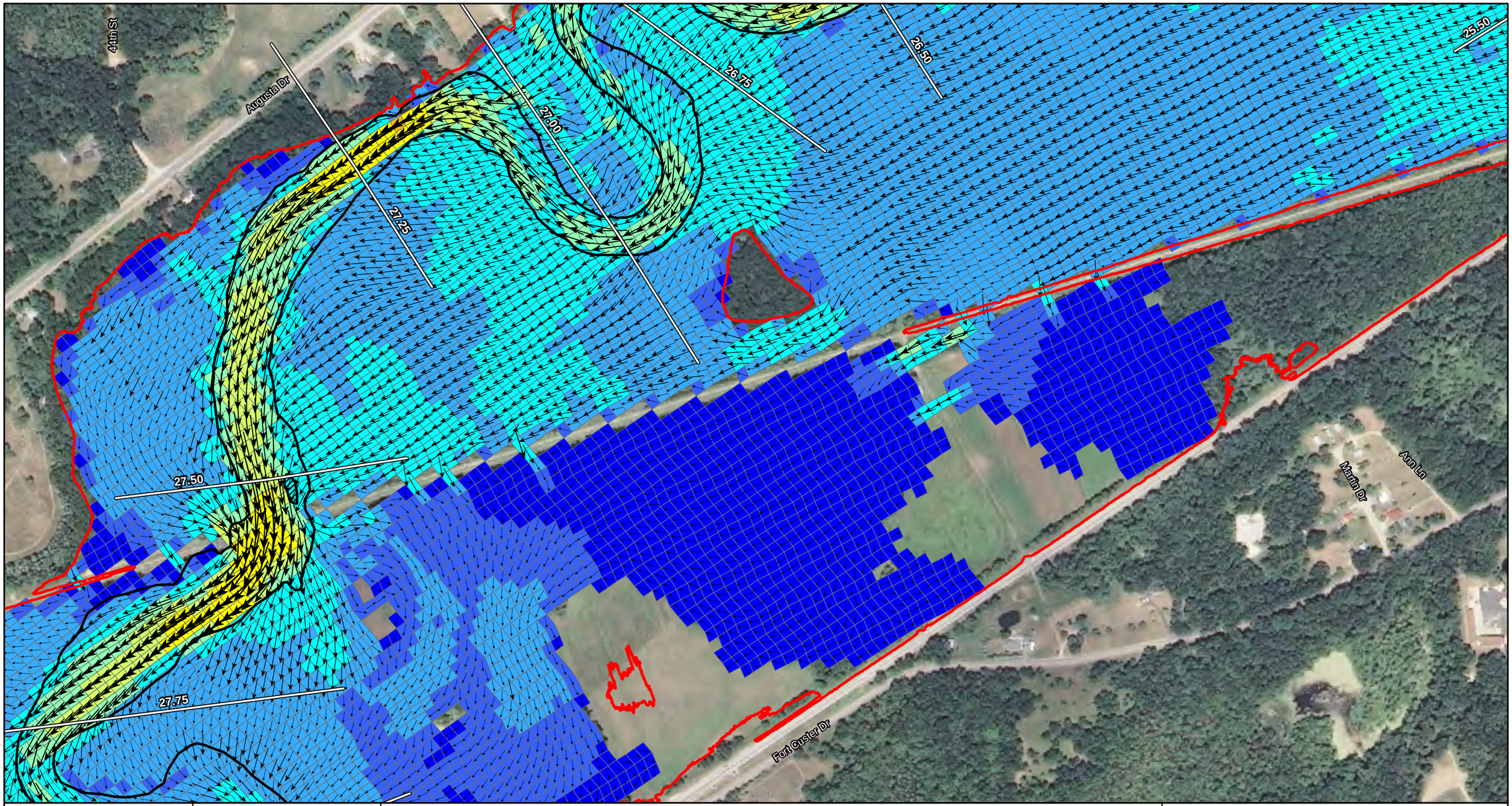
MP 25.79 - MP 26.80

SHEET 27 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_100yr.mxd

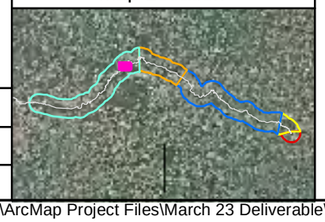
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

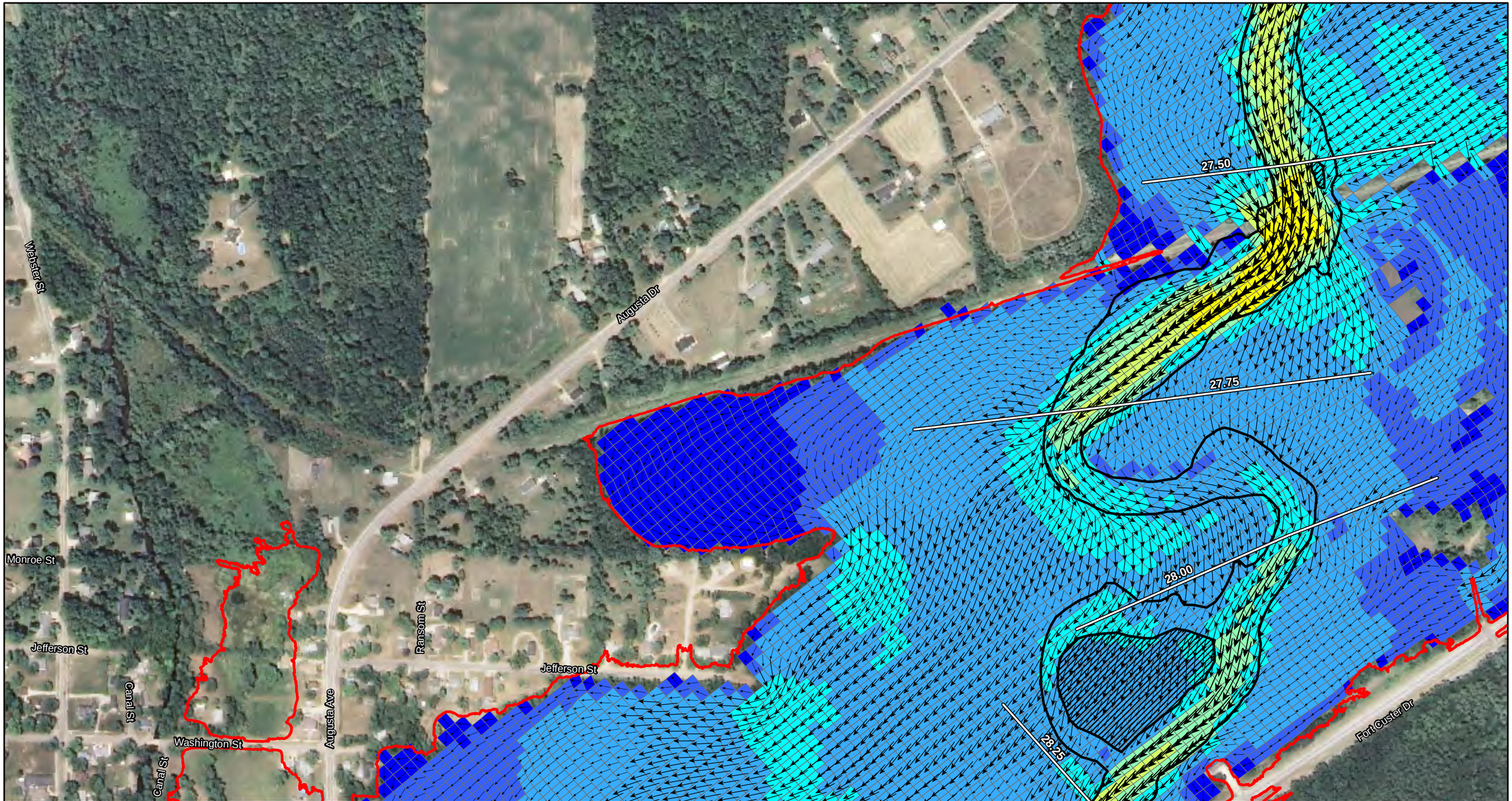
MP 26.80 - MP 27.80

SHEET 28 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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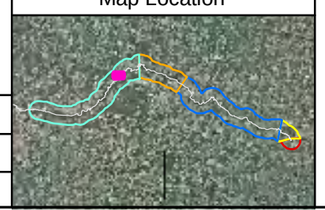
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

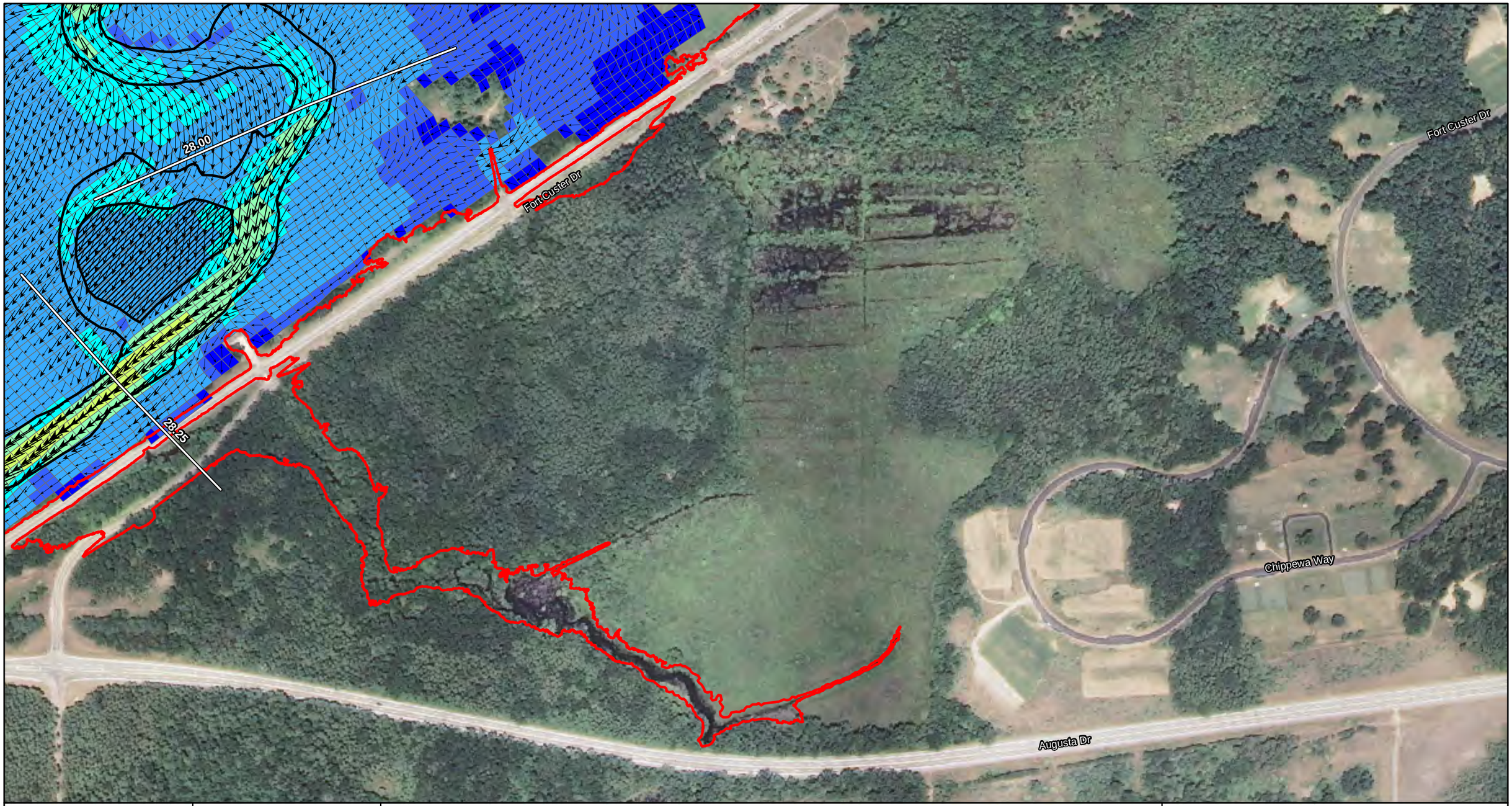
MP 26.80 - MP 27.80

SHEET 29 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_100yr.mxd

Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

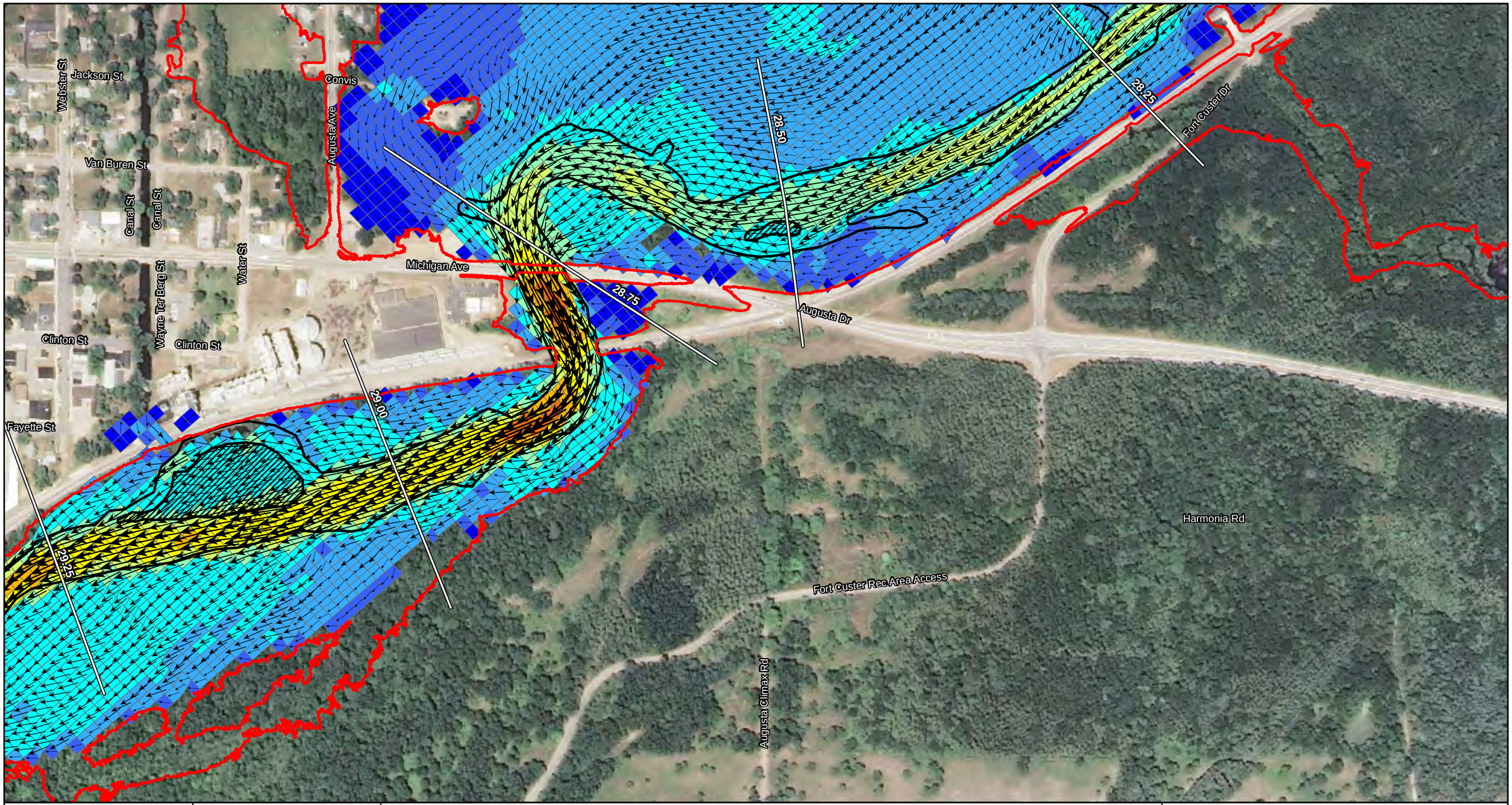
MP 27.80SE - MP 28.22SE

SHEET 30 OF 45

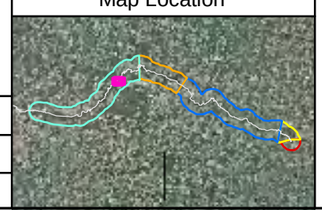
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_100yr.mxd

Aerial Photography Date: July & August 2009



Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

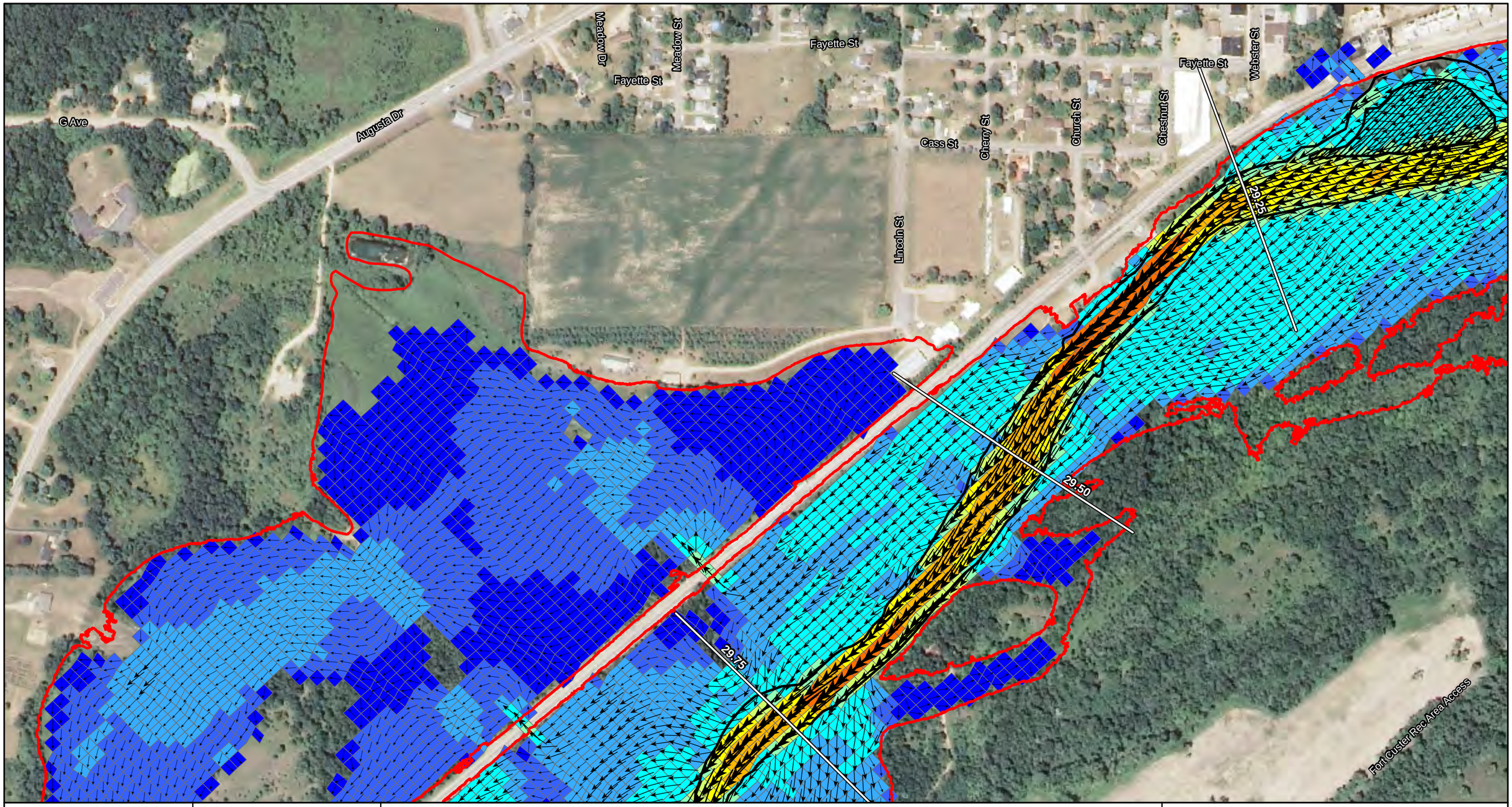
MP 28.22 - MP 29.20

SHEET 31 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_100yr.mxd

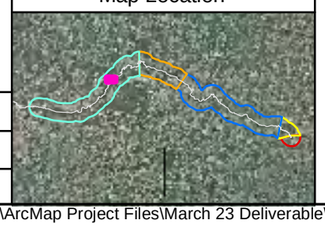
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

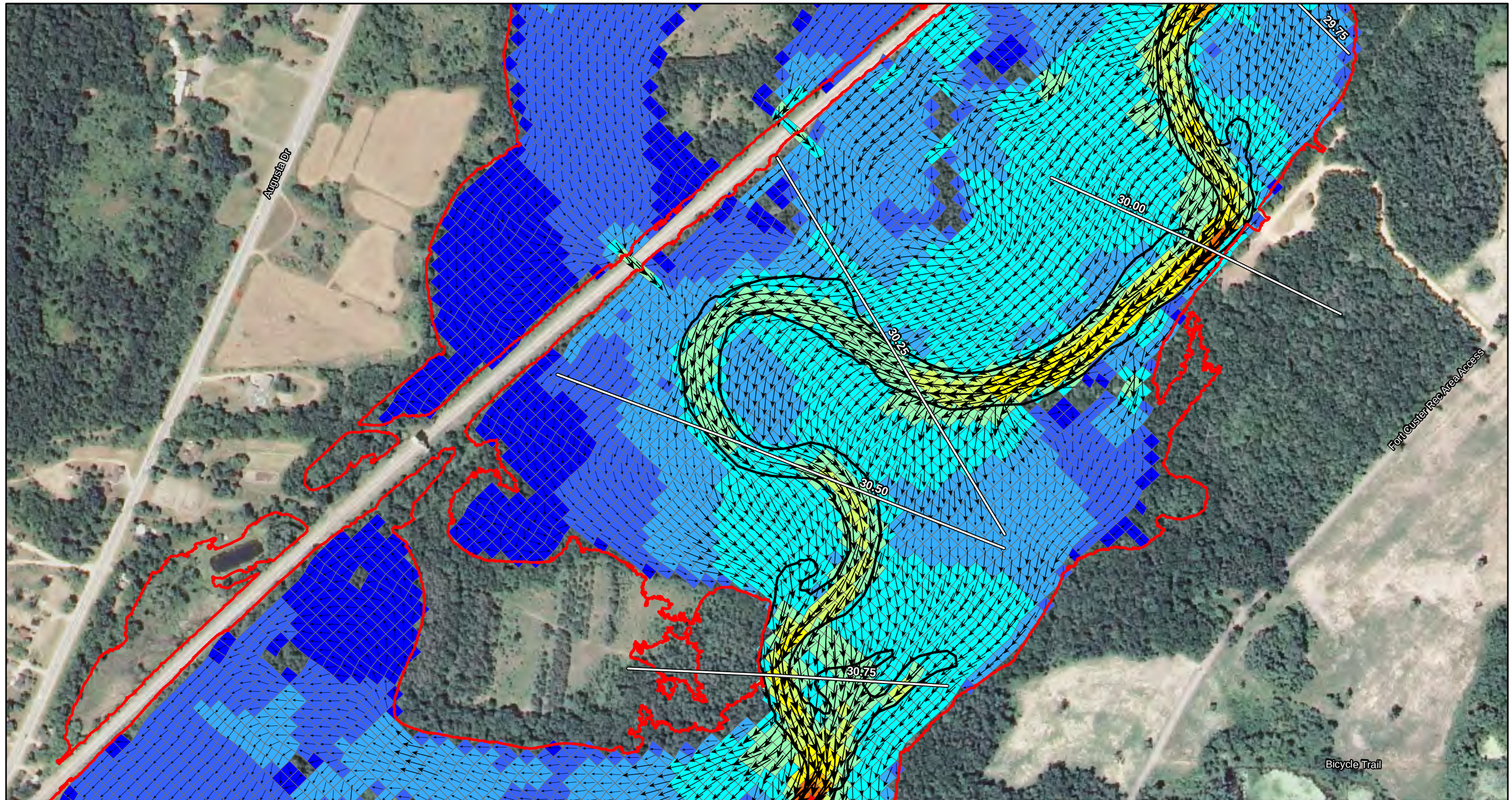
MP 29.20 - MP 29.82

SHEET 32 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

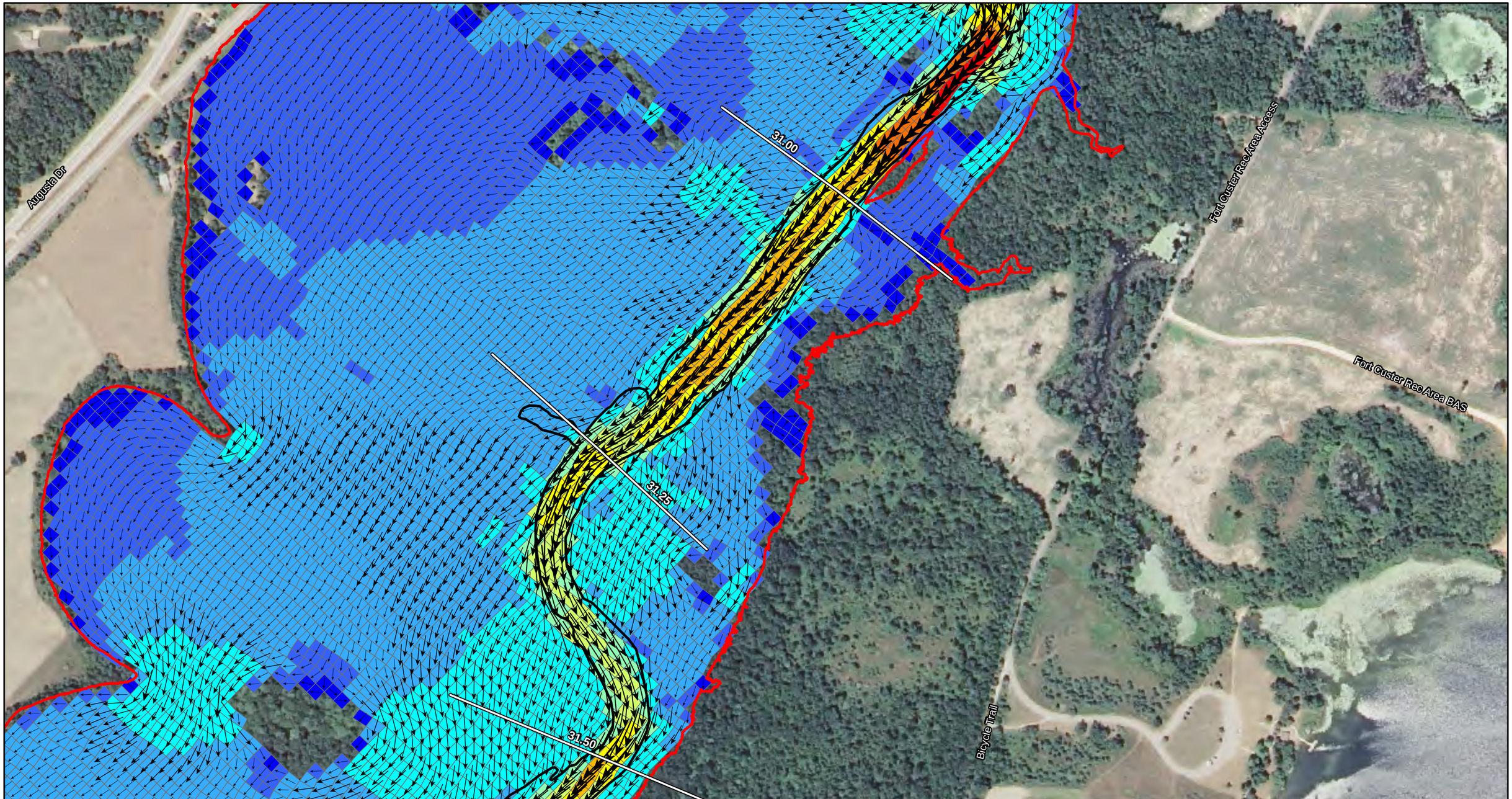
MP 29.82 - MP 30.84

SHEET 33 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

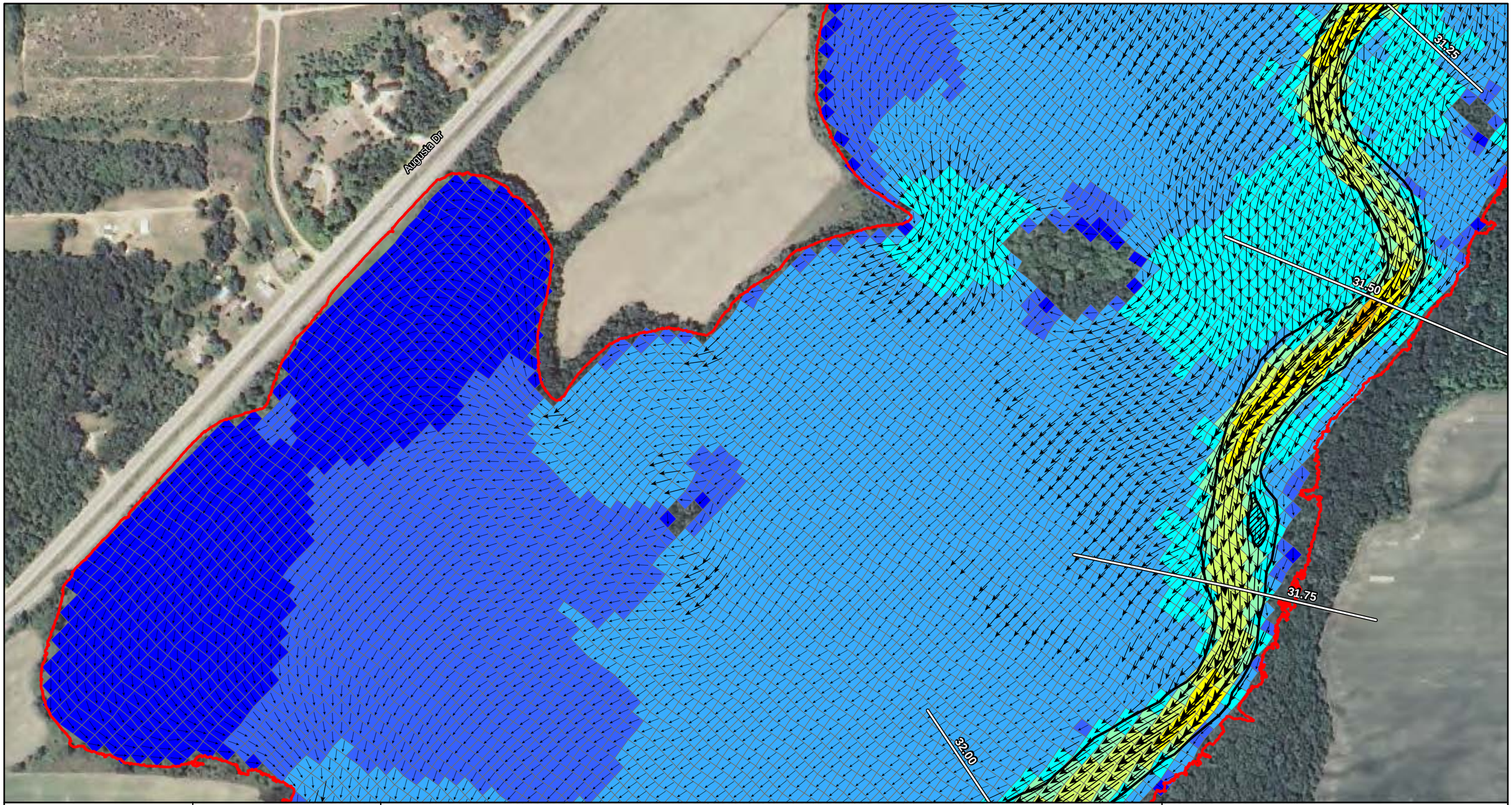
MP 30.84 - MP 31.40

SHEET 34 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

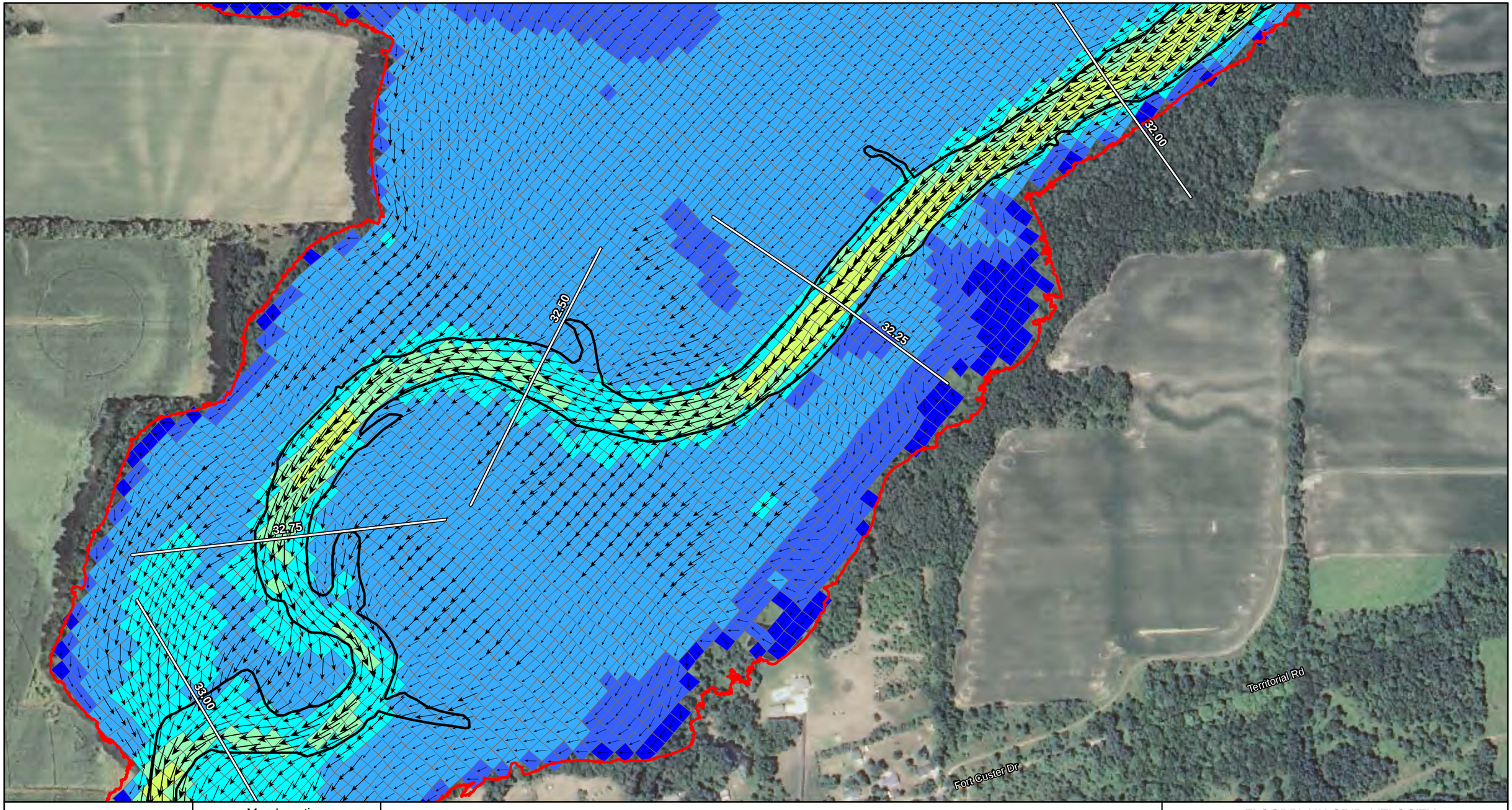
MP 31.40 - MP 31.94

SHEET 35 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_100yr.mxd

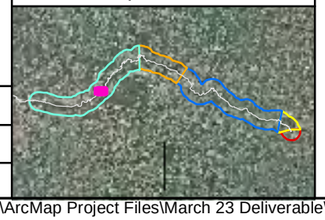
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

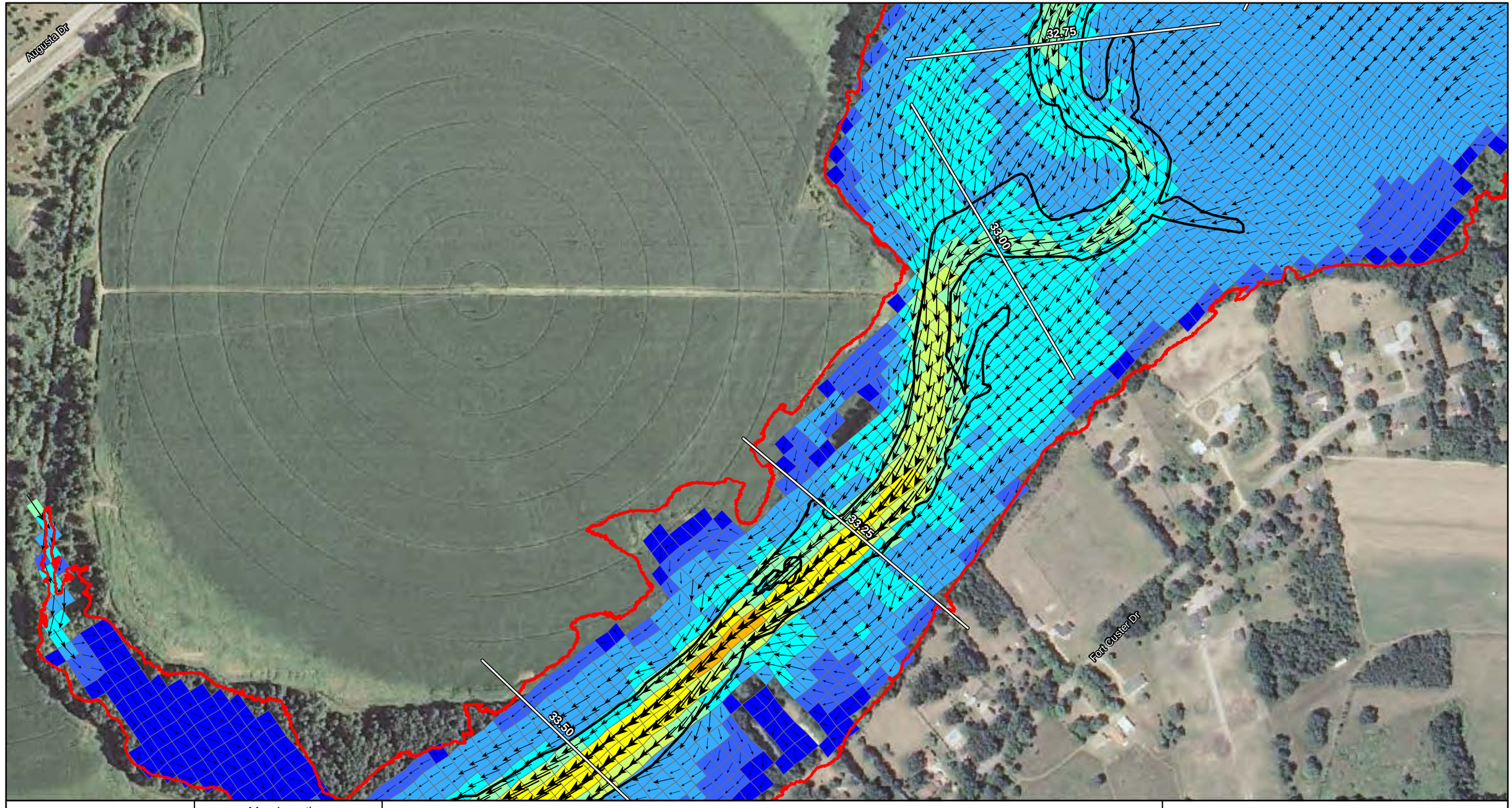
MP 31.94 - MP 33.00

SHEET 36 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_100yr.mxd

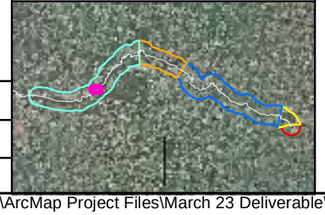
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

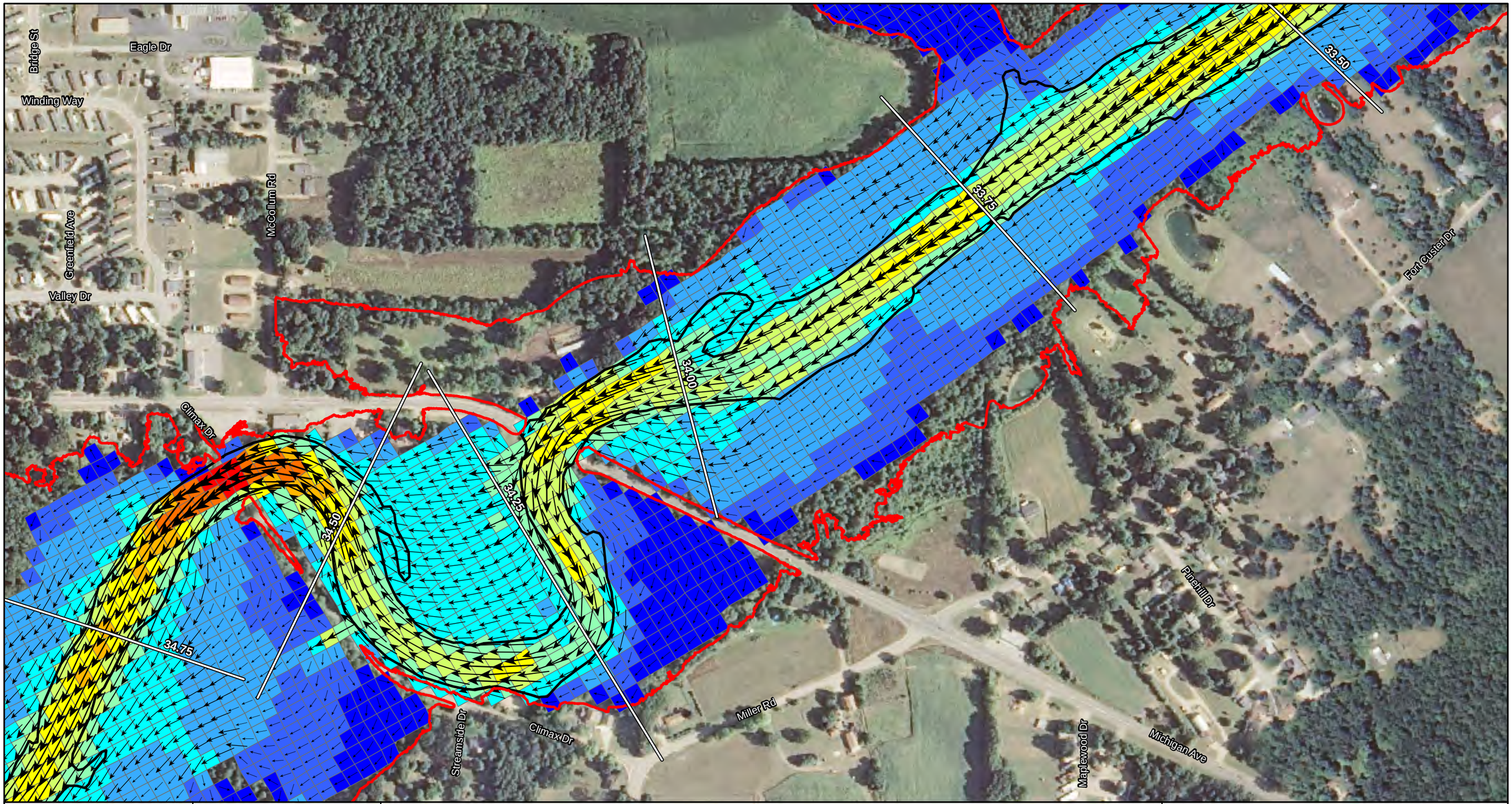
MP 33.00 - MP 33.52

SHEET 37 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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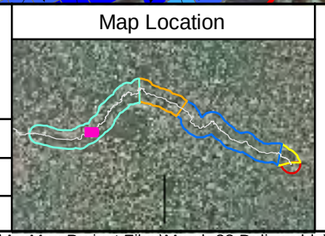
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)
- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

Flow Direction and Relative Magnitude
Channel Bankline
Island Bankline
HEC-RAS 100-Year Floodplain
Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700
Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

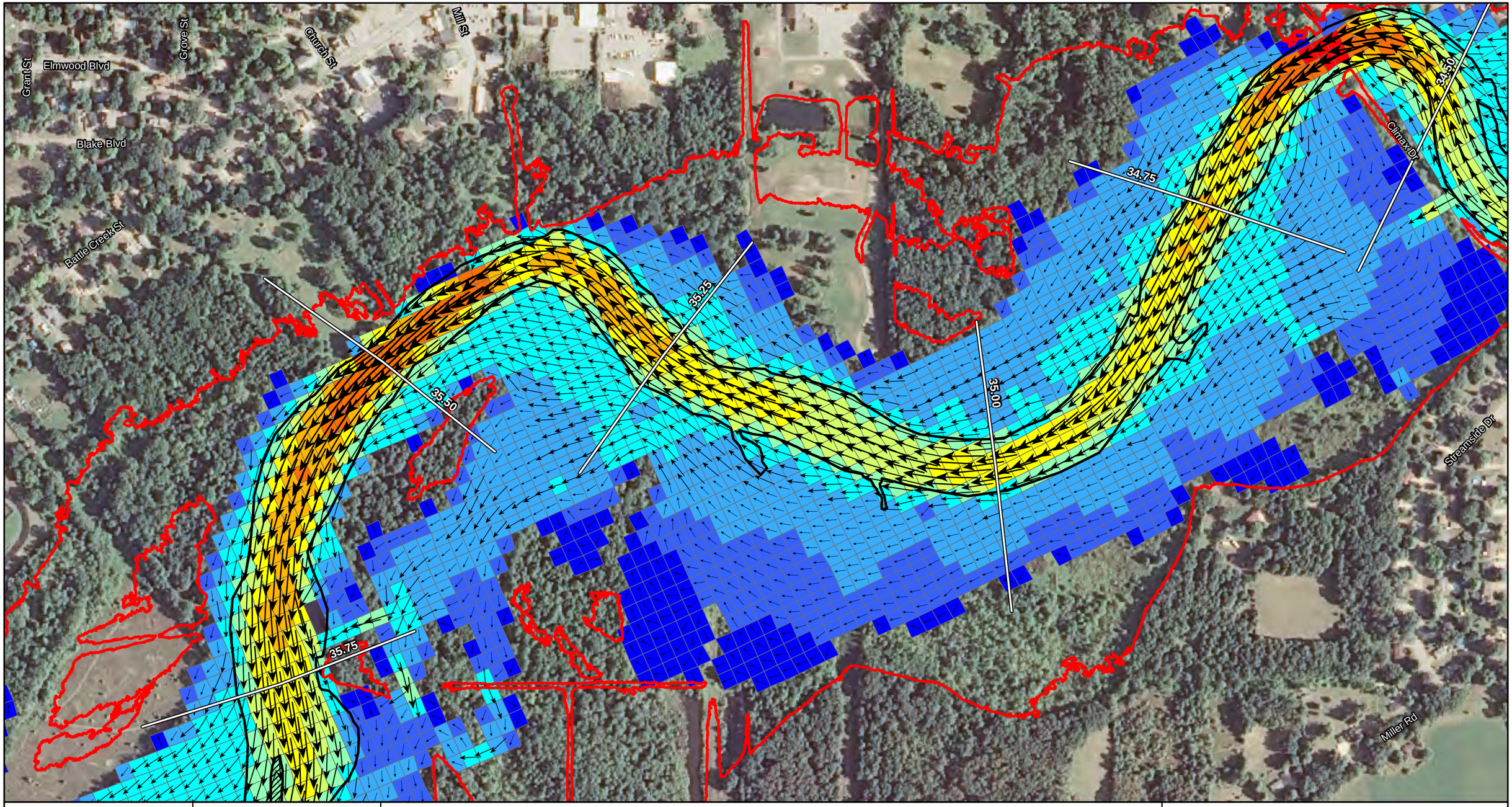
MP 33.52 - MP 34.70

SHEET 38 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

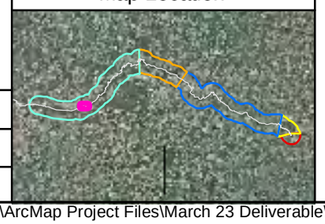
X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_100yr.mxd

Aerial Photography Date: July & August 2009



Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

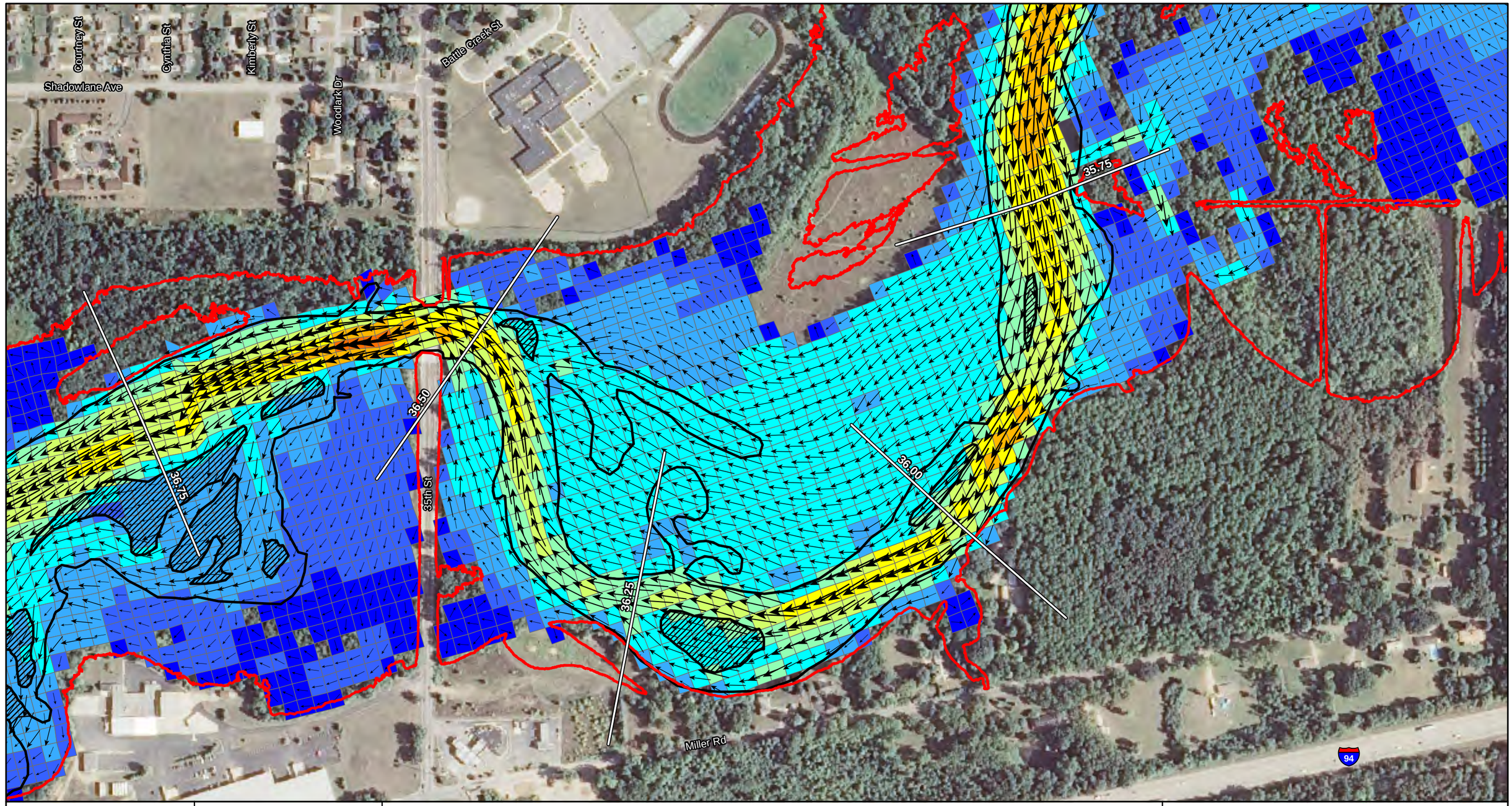
MP 34.70 - MP 35.75

SHEET 39 OF 45

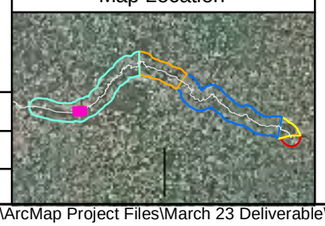
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

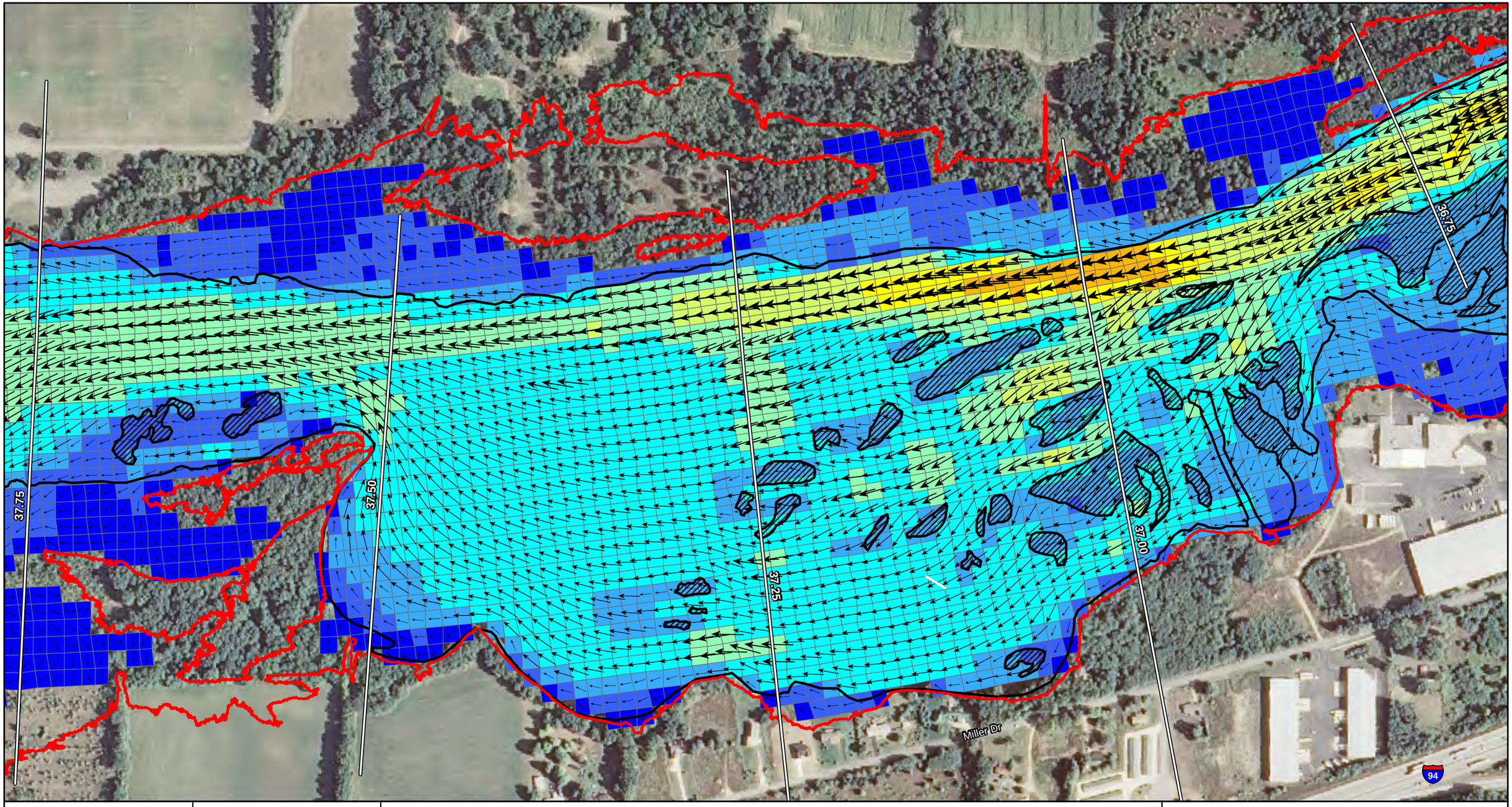
MP 35.75 - MP 36.75

SHEET 40 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_100yr.mxd

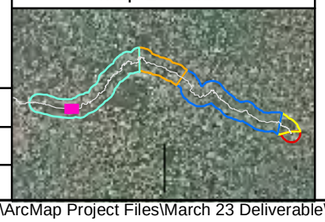
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

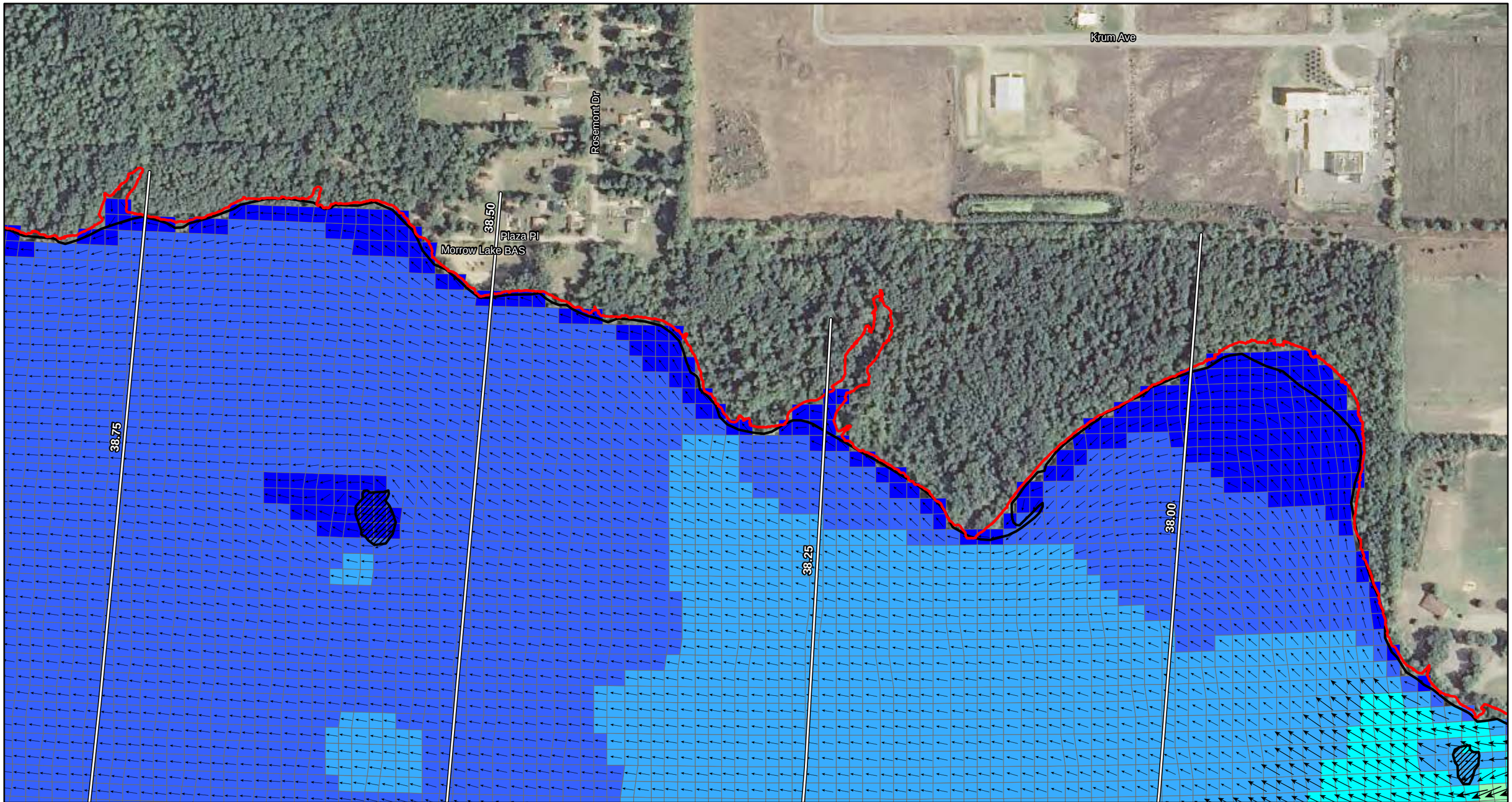
MP 36.75 - MP 37.75

SHEET 41 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

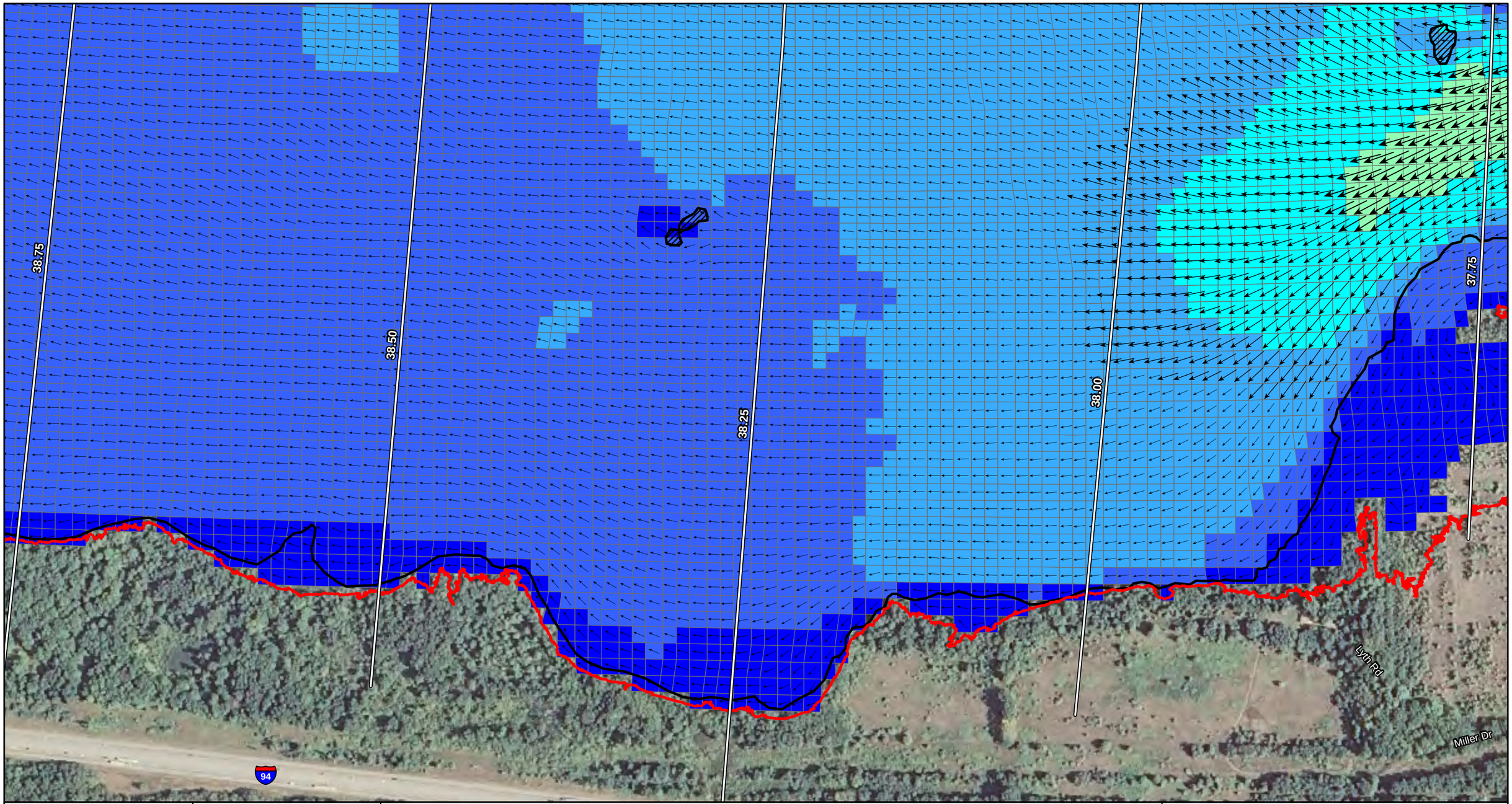
MP 37.75N - MP 38.80N

SHEET 42 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_100yr.mxd

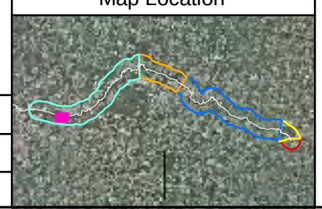
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

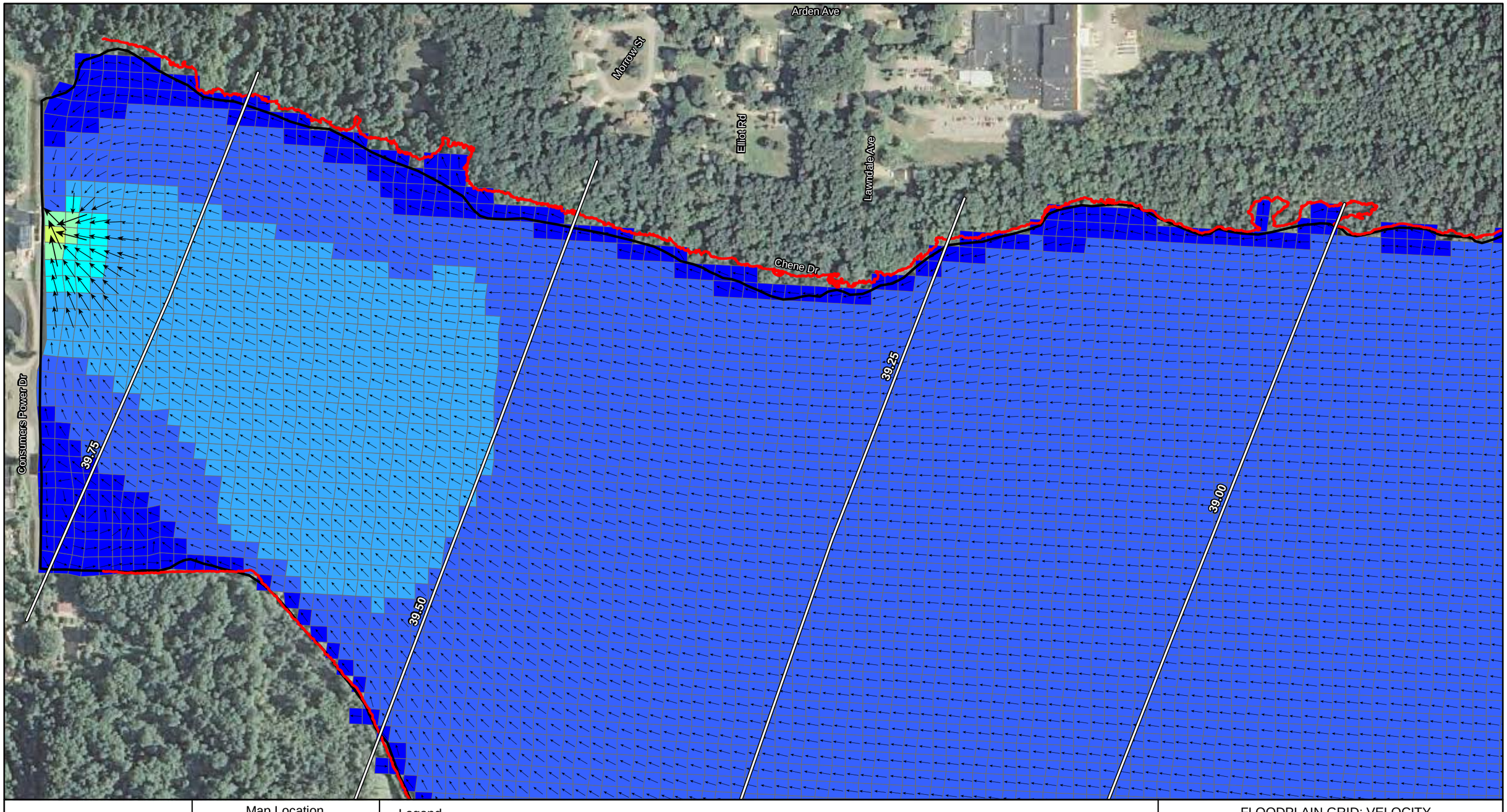
MP 37.75S - MP 38.80S

SHEET 43 OF 45

ENBRIDGE LINE 6B MP 608
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ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_100yr.mxd

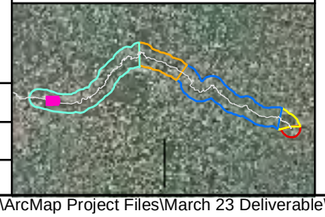
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

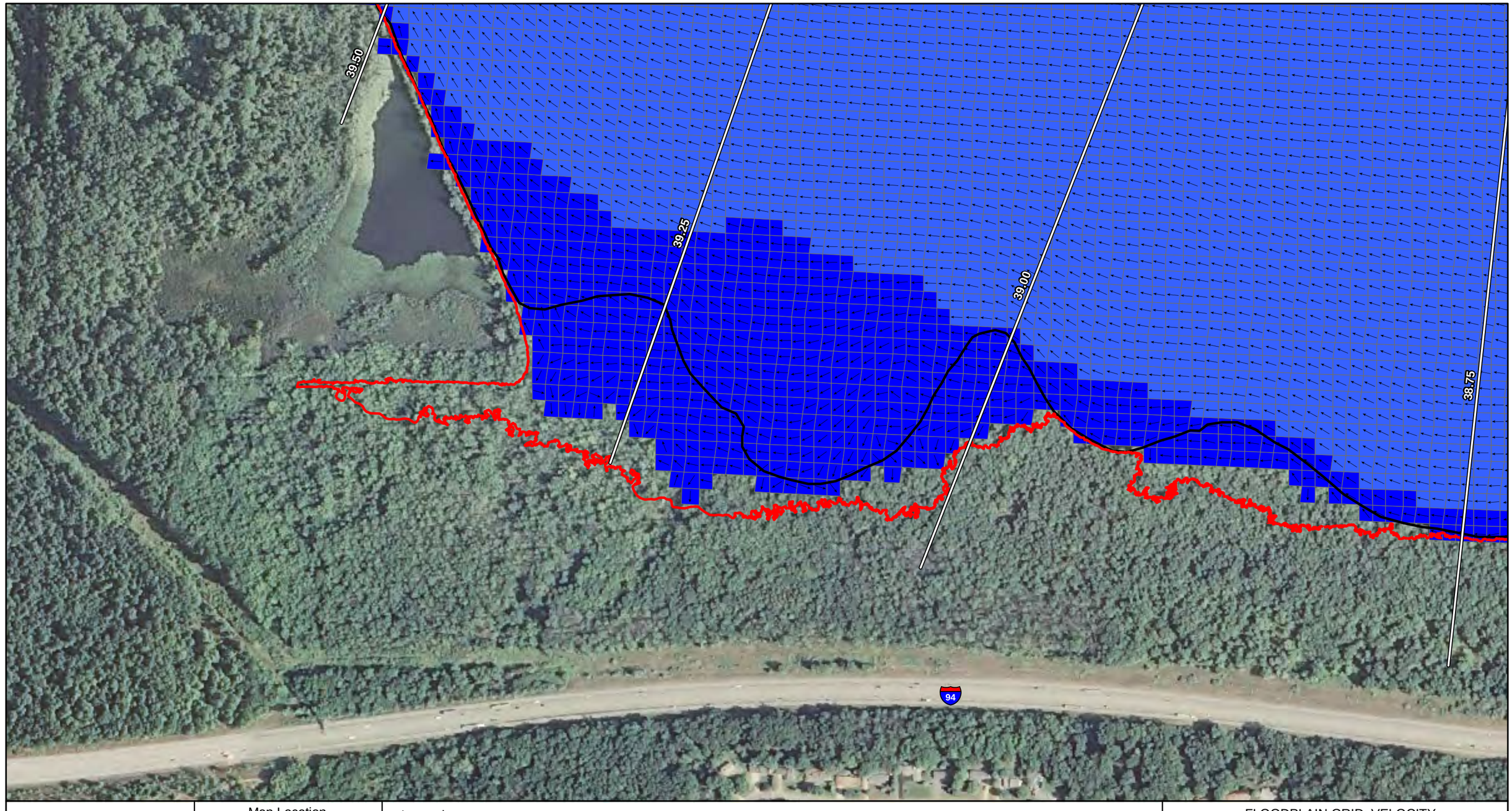
MP 38.80N - MP 39.95N

SHEET 44 OF 45

ENBRIDGE LINE 6B MP 608
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X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_100yr.mxd

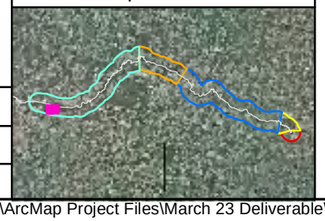
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Velocity (ft/sec)

- < 0.1 ft/sec
- 0.1 - 0.25 ft/sec
- 0.25 - 0.5 ft/sec
- 0.5 - 1.0 ft/sec
- 1.0 - 1.5 ft/sec
- 1.5 - 2.0 ft/sec
- 2.0 - 2.5 ft/sec
- 2.5 - 3.0 ft/sec
- 3.0 - 4.0 ft/sec
- > 4.0 ft/sec

- Flow Direction and Relative Magnitude
- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

ft/sec = Feet Per Second

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: VELOCITY
100-YEAR FLOOD

MP 38.80S - MP 39.95S

SHEET 45 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Velocity_100yr.mxd

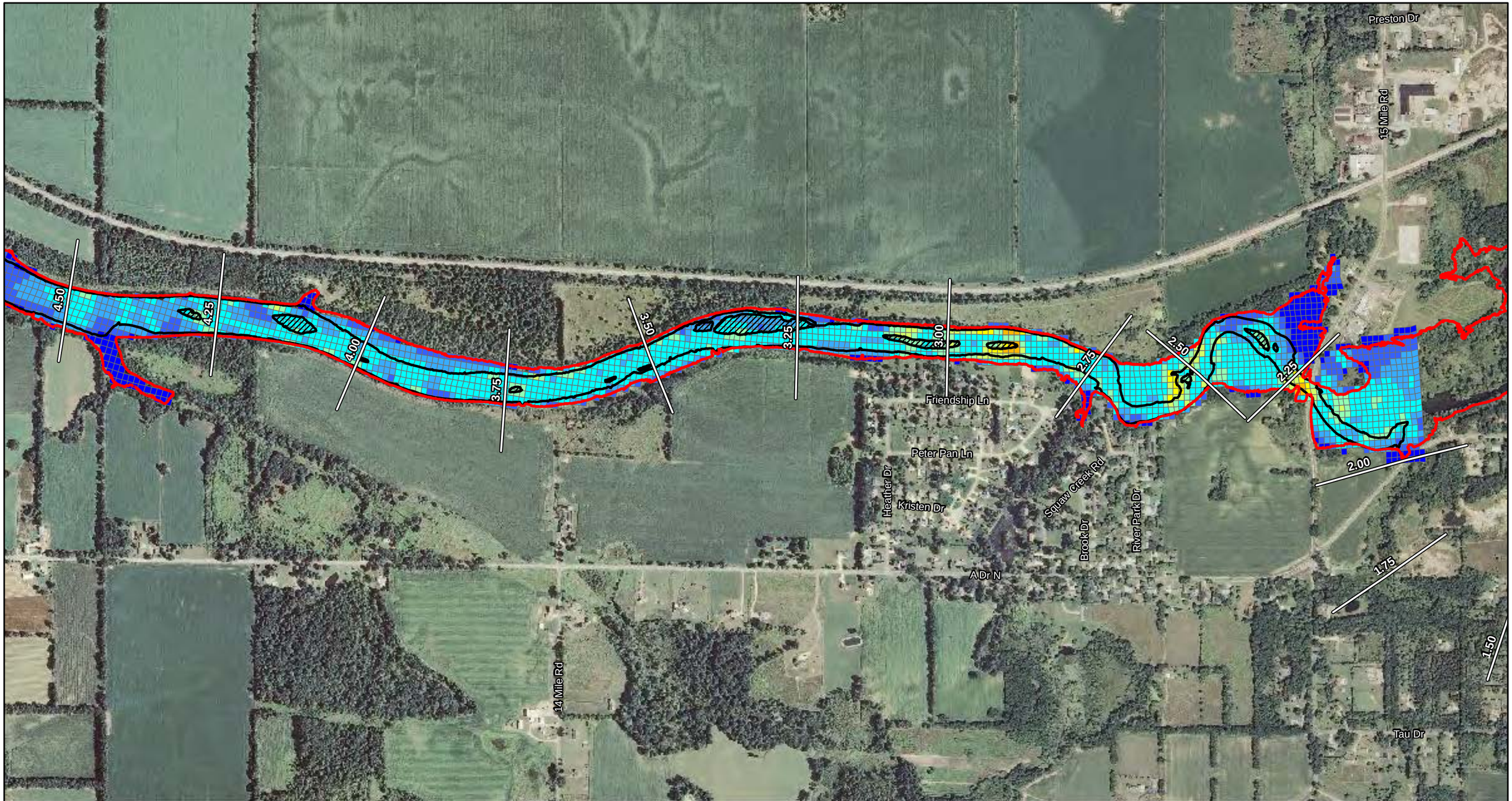
Aerial Photography Date: July & August 2009

Figure 6-13

Floodplain Grid: Bed Shear Stress

100-Year Flood

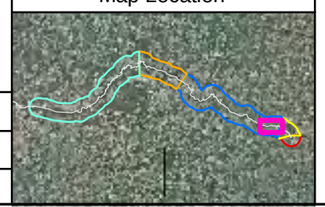
Sheets 1 through 16



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa)

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals

N

0 400 800 1,600

Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
100-YEAR FLOOD

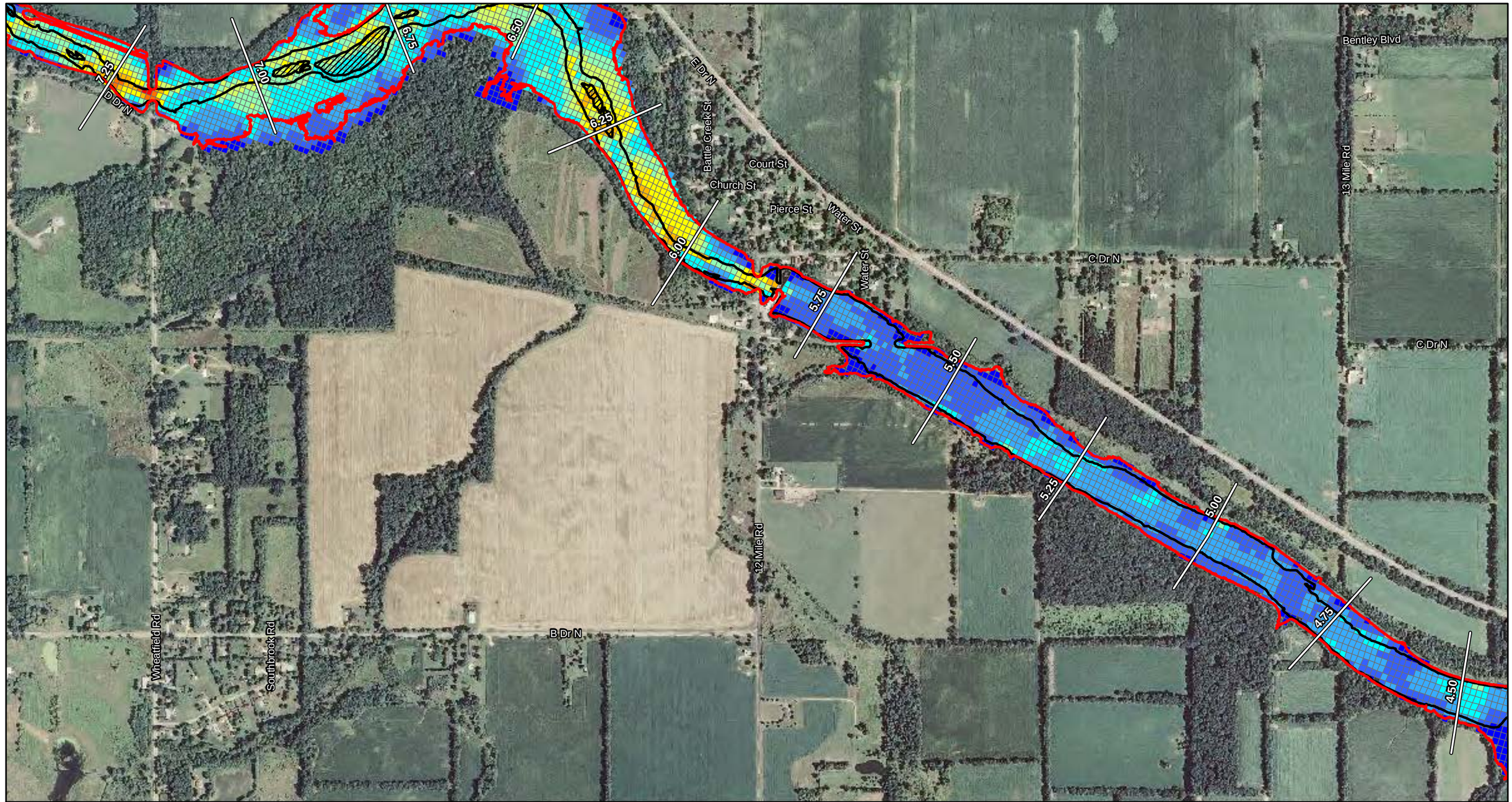
MP 1.50 - MP 4.50

SHEET 1 OF 16

ENBRIDGE LINE 6B MP 608
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X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_100yr.mxd

Aerial Photography Date: July & August 2009



Map Location



Legend

Bed Shear Stress (Pa)

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals

N

0 400 800 1,600

Scale in Feet

ENBRIDGE

Drawn:	BRS	3/23/2012
Approved:	DBR	3/23/2012
Project #:	106-4186	

FLOODPLAIN GRID: BED SHEAR STRESS
100-YEAR FLOOD

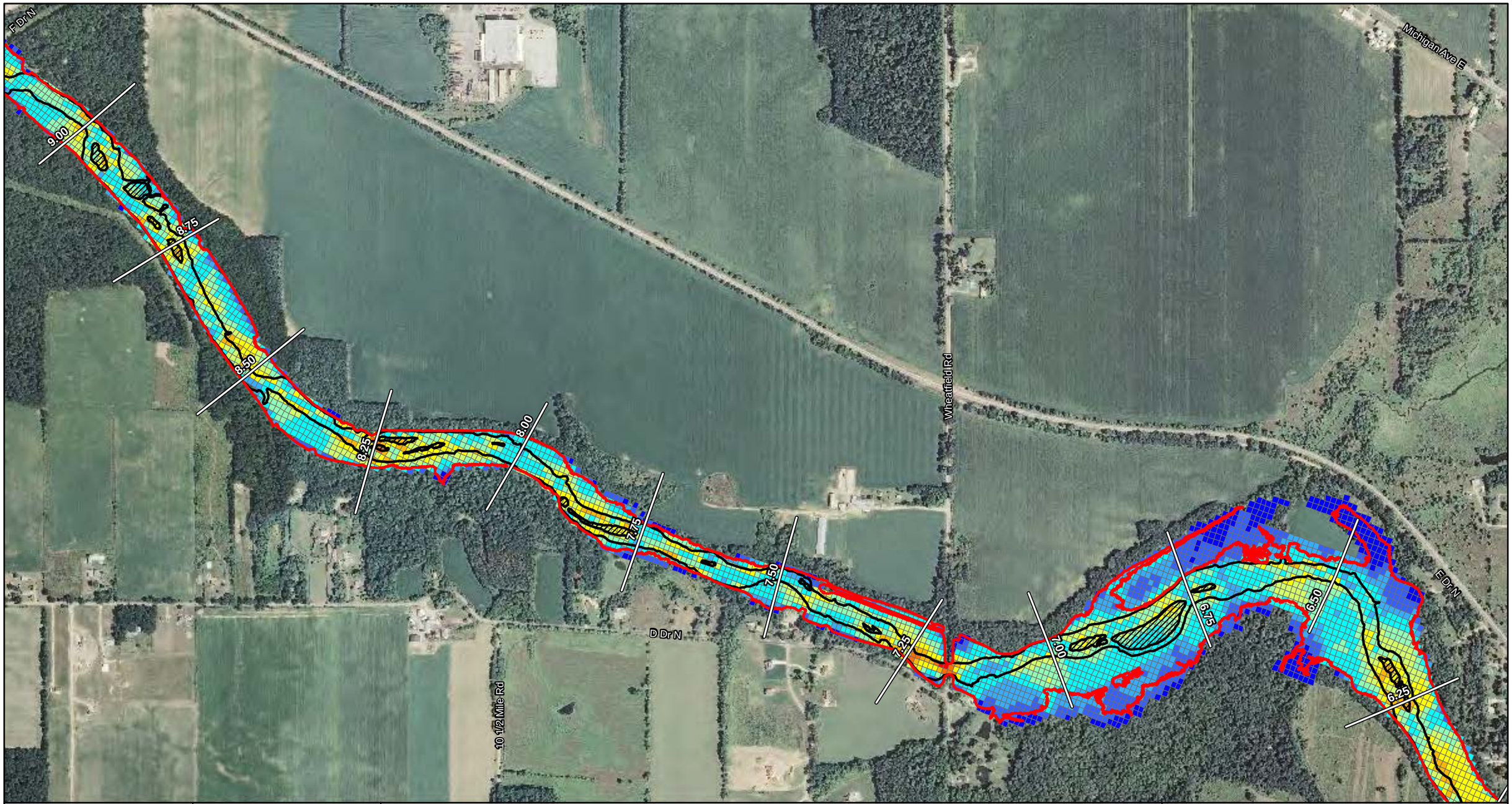
MP 4.50 - MP 6.25

SHEET 2 OF 16

ENBRIDGE LINE 6B MP 608
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X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_100yr.mxd

Aerial Photography Date: July & August 2009



Map Location



Legend

Bed Shear Stress (Pa)

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals

N

0 400 800 1,600

Scale in Feet

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

FLOODPLAIN GRID: BED SHEAR STRESS
100-YEAR FLOOD

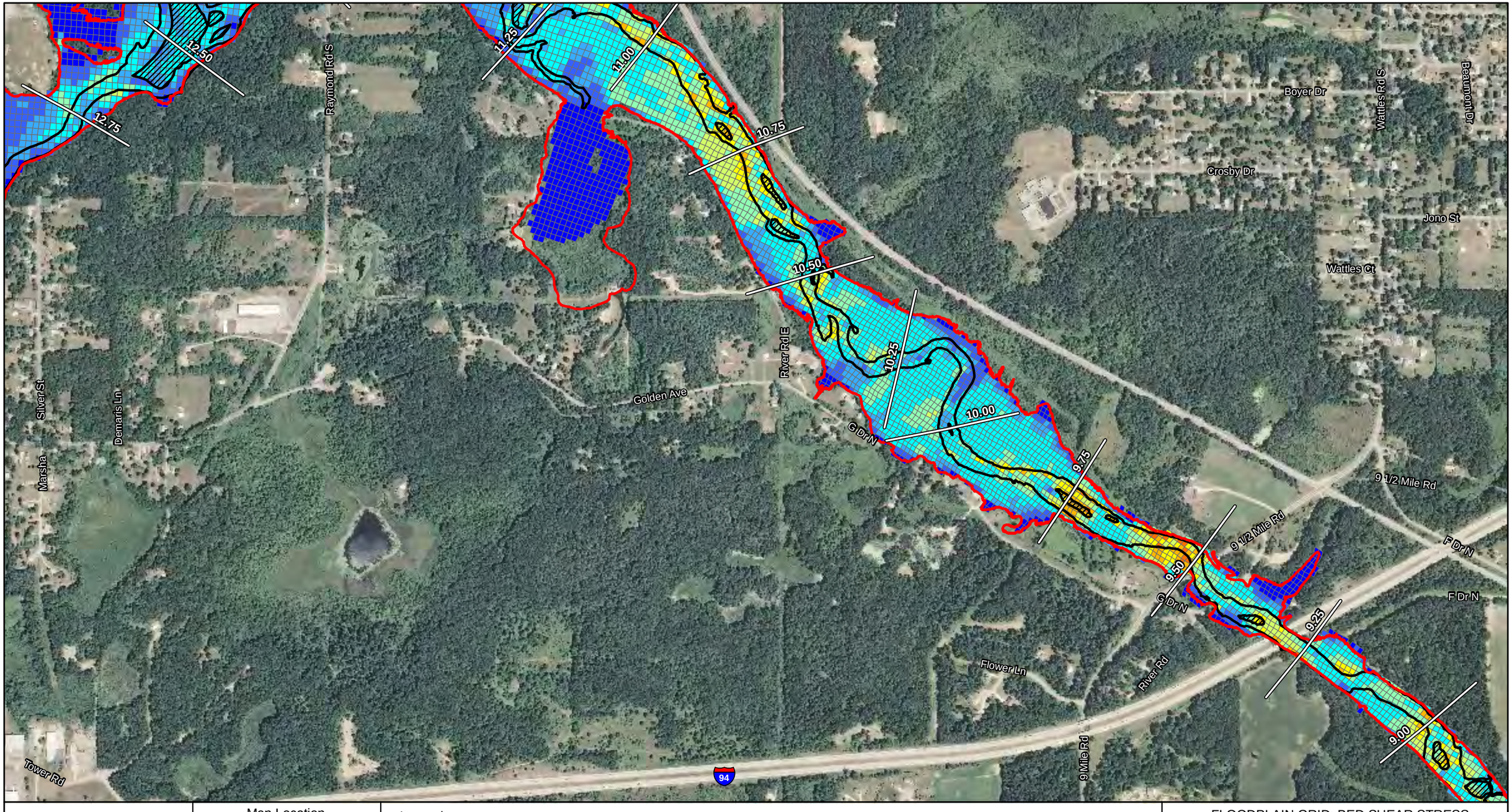
MP 6.25 - MP 9.00

SHEET 3 OF 16

ENBRIDGE LINE 6B MP 608
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X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_100yr.mxd

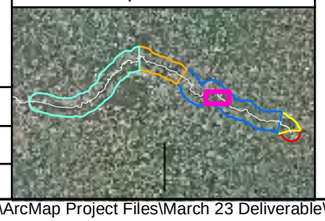
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa)

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals

N

0 400 800 1,600

Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
100-YEAR FLOOD

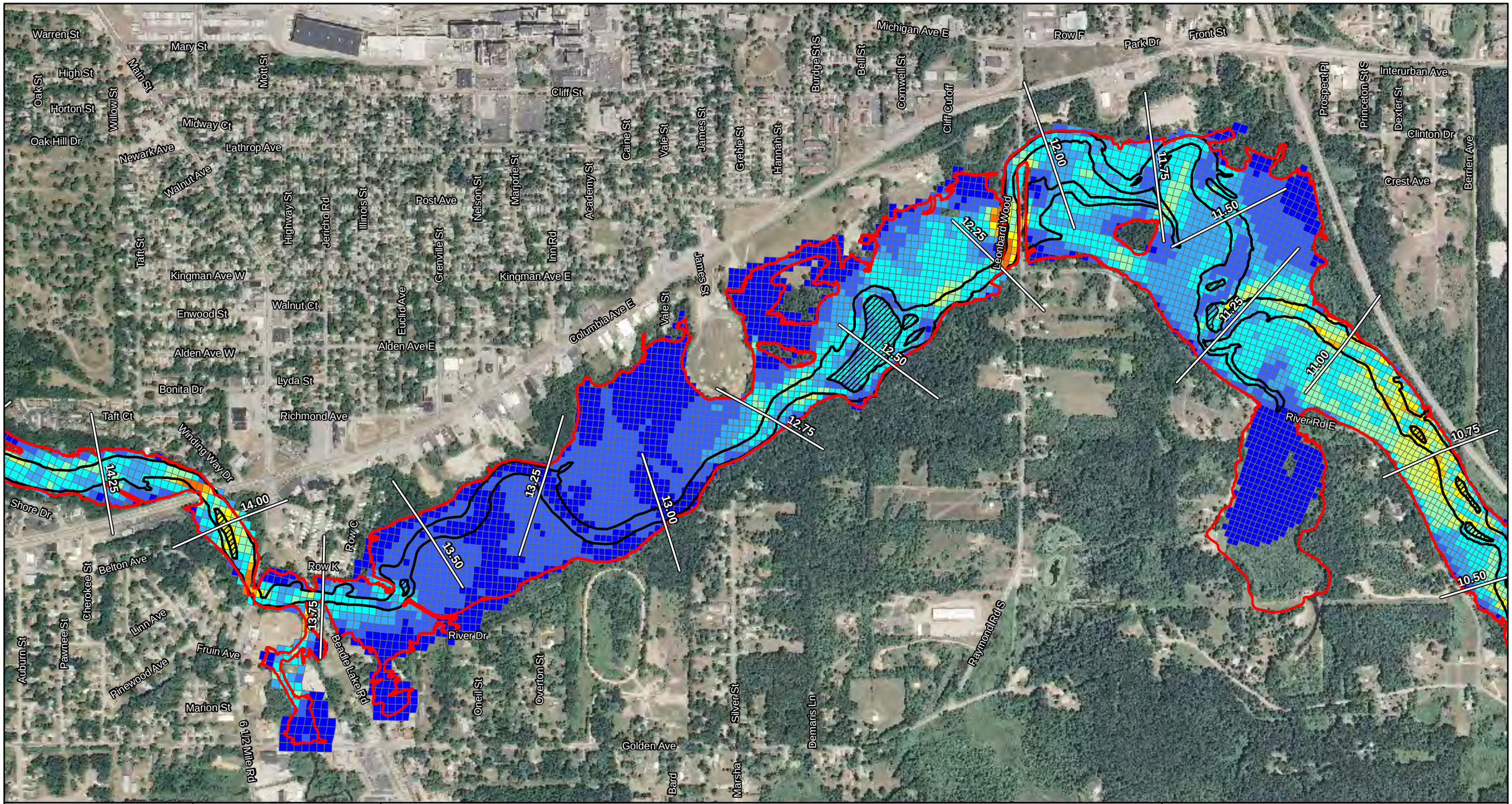
MP 9.00 - MP 10.50

SHEET 4 OF 16

ENBRIDGE LINE 6B MP 608
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Aerial Photography Date: July & August 2009



Map Location



Legend

Bed Shear Stress (Pa)

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals

N

0 400 800 1,600

Scale in Feet

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

FLOODPLAIN GRID: BED SHEAR STRESS
100-YEAR FLOOD

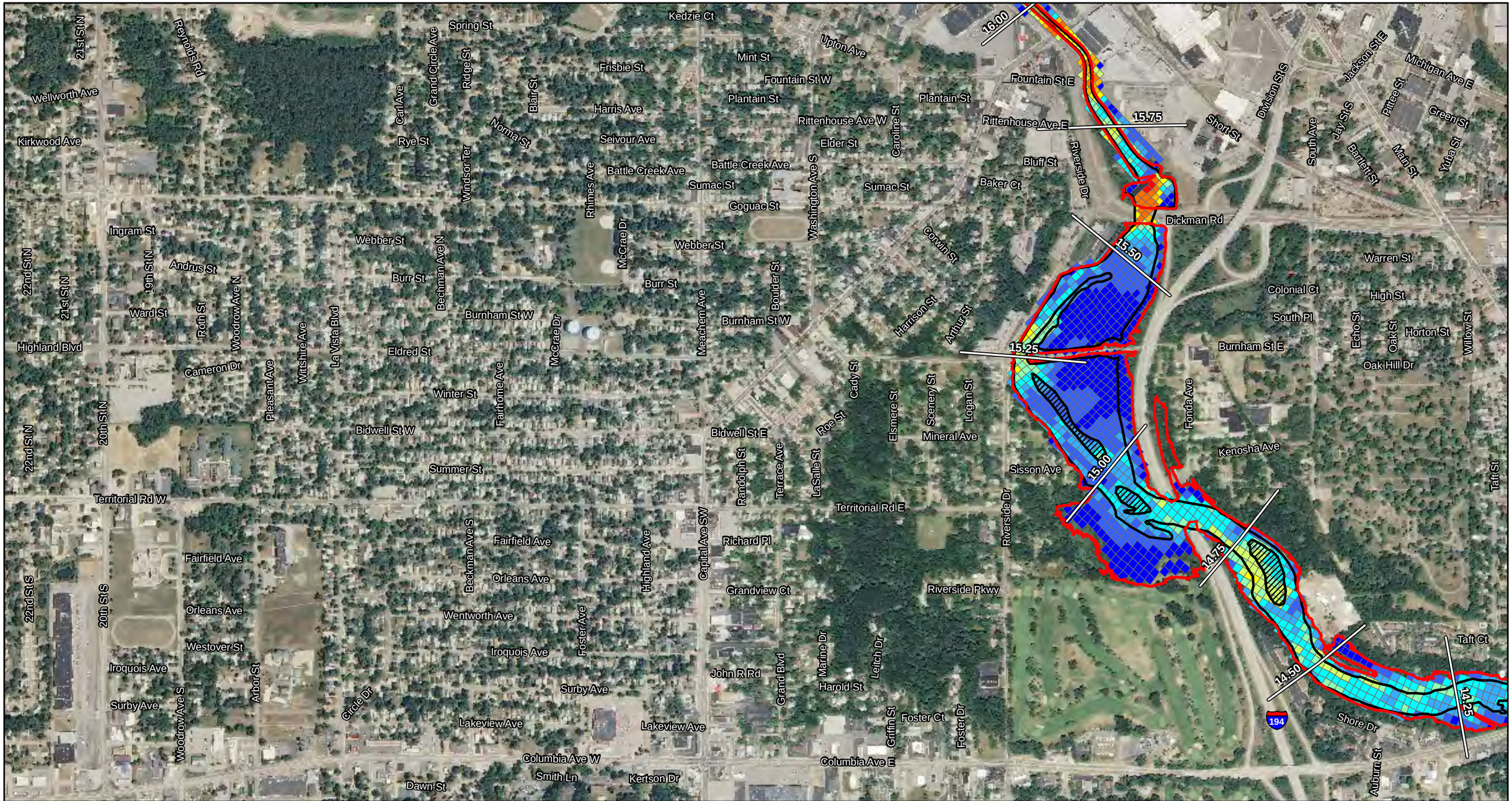
MP 10.50 - MP 14.25

SHEET 5 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa)

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals

N

0 400 800 1,600

Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
100-YEAR FLOOD

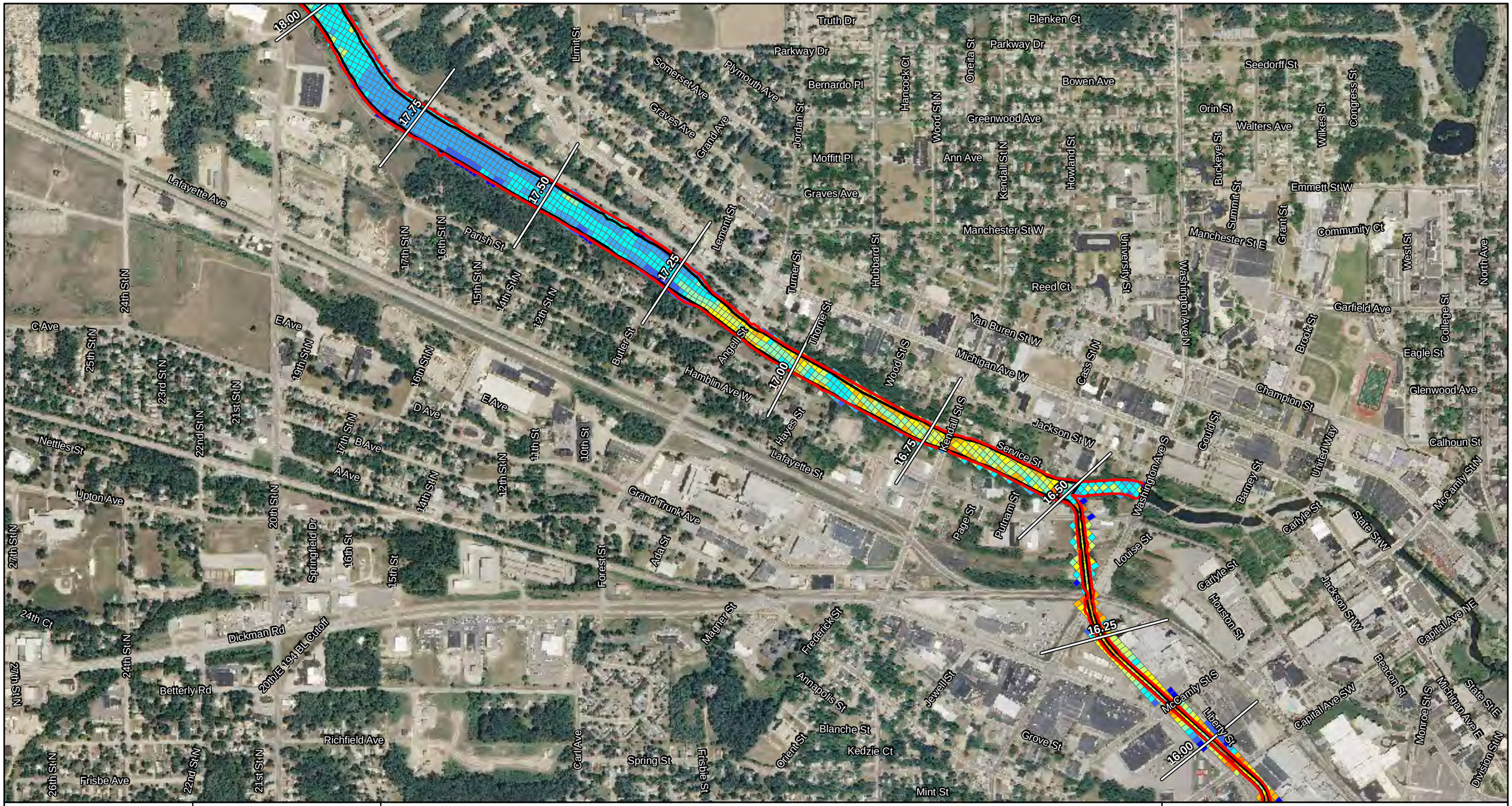
MP 14.25 - MP 16.00

SHEET 6 OF 16

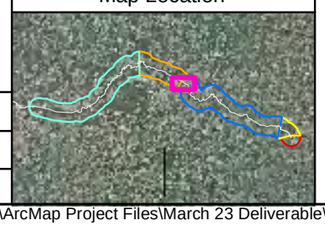
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



Map Location



Legend

Bed Shear Stress (Pa)

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals

N

0 400 800 1,600

Scale in Feet

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

FLOODPLAIN GRID: BED SHEAR STRESS
100-YEAR FLOOD

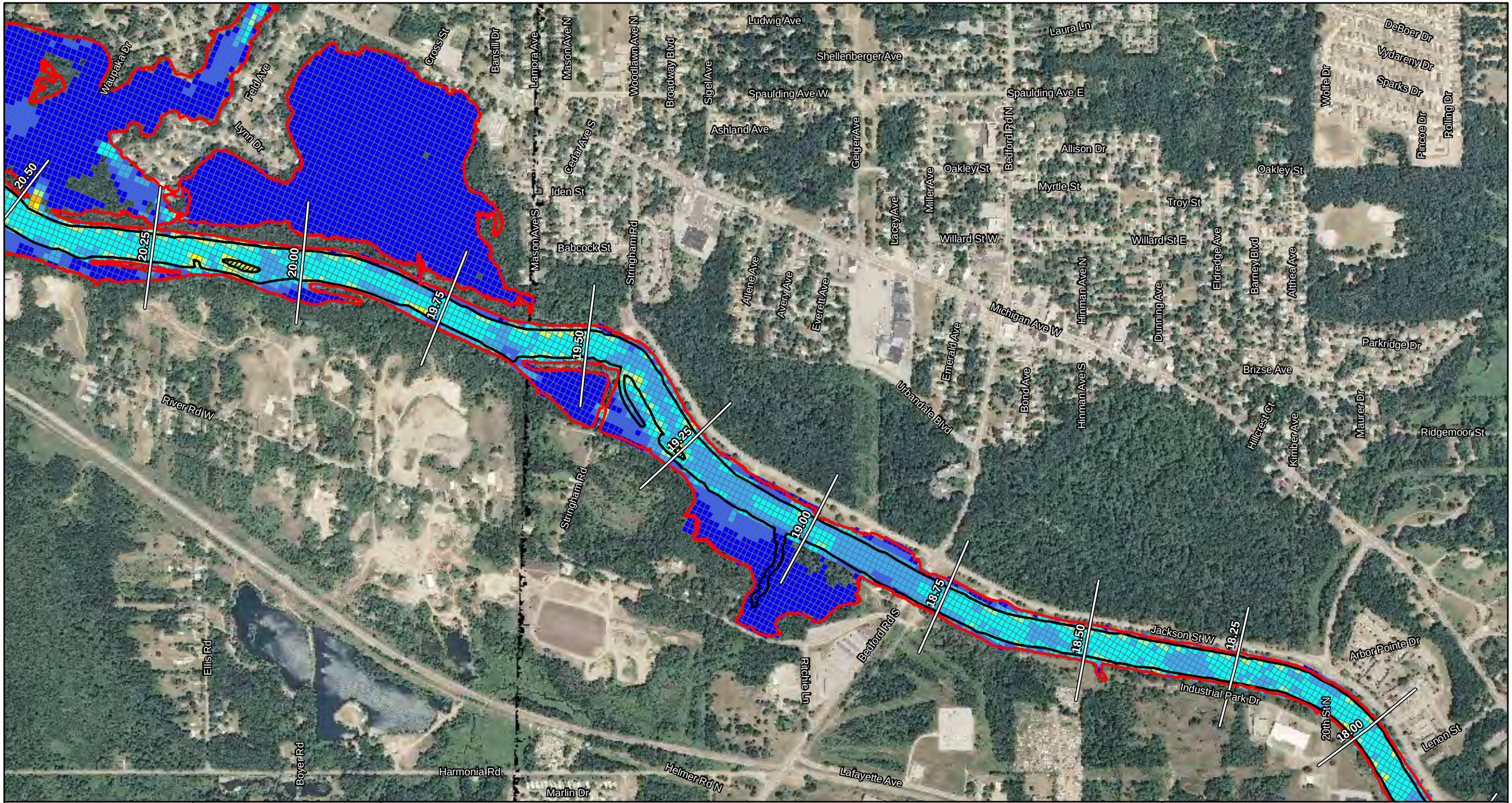
MP 16.00 - MP 18.00

SHEET 7 OF 16

ENBRIDGE LINE 6B MP 608
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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa)

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals

N

0 400 800 1,600

Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
100-YEAR FLOOD

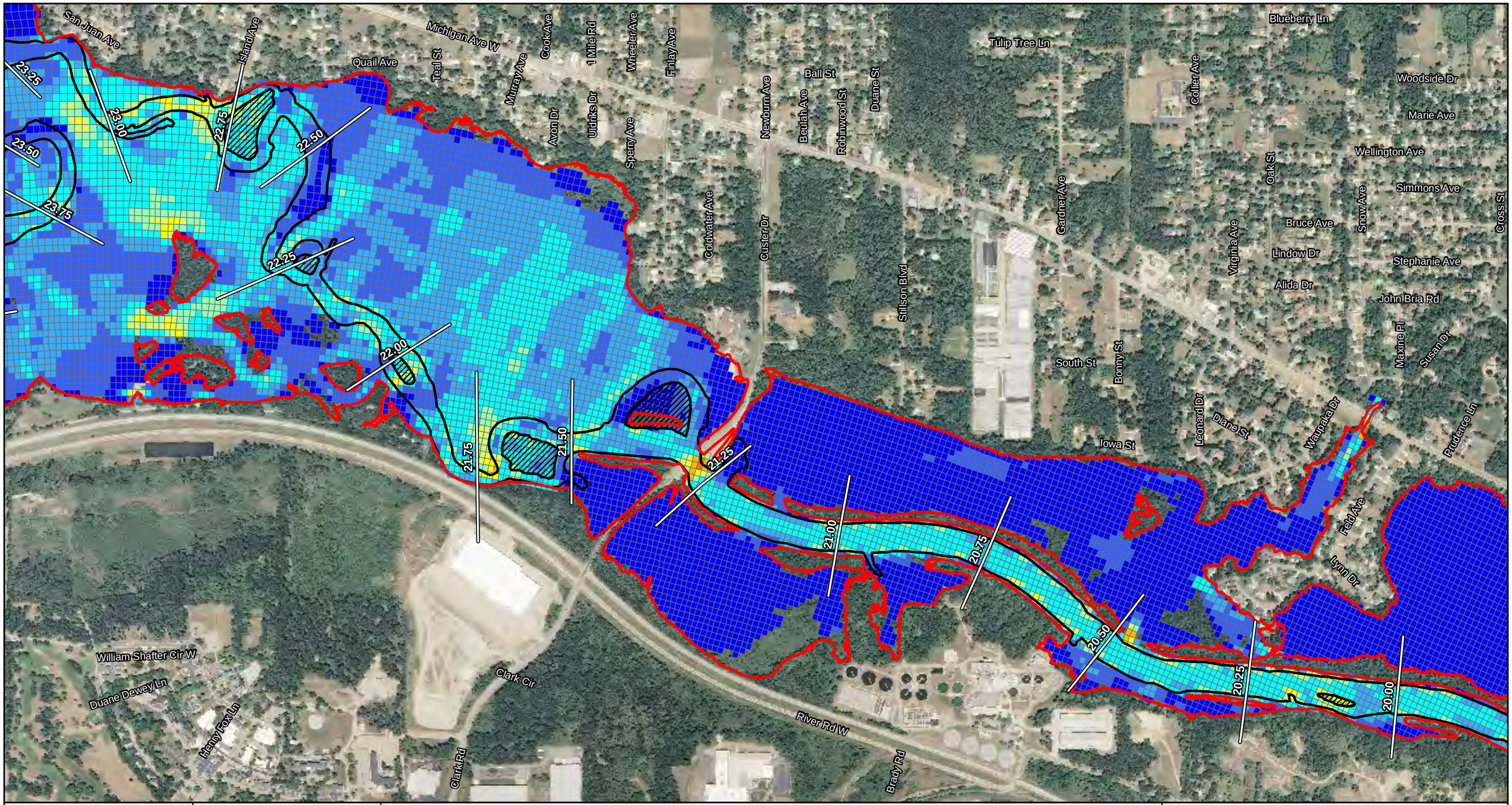
MP 18.00 - MP 20.00

SHEET 8 OF 16

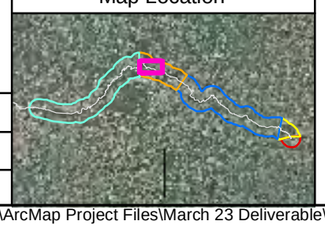
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



Map Location



Legend

Bed Shear Stress (Pa)

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

Channel Bankline

Island Bankline

HEC-RAS 100-Year Floodplain

Quarter Mile Grid Segment

Pa = Pascals

N

0 400 800 1,600

Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
100-YEAR FLOOD

MP 20.00 - MP 22.50

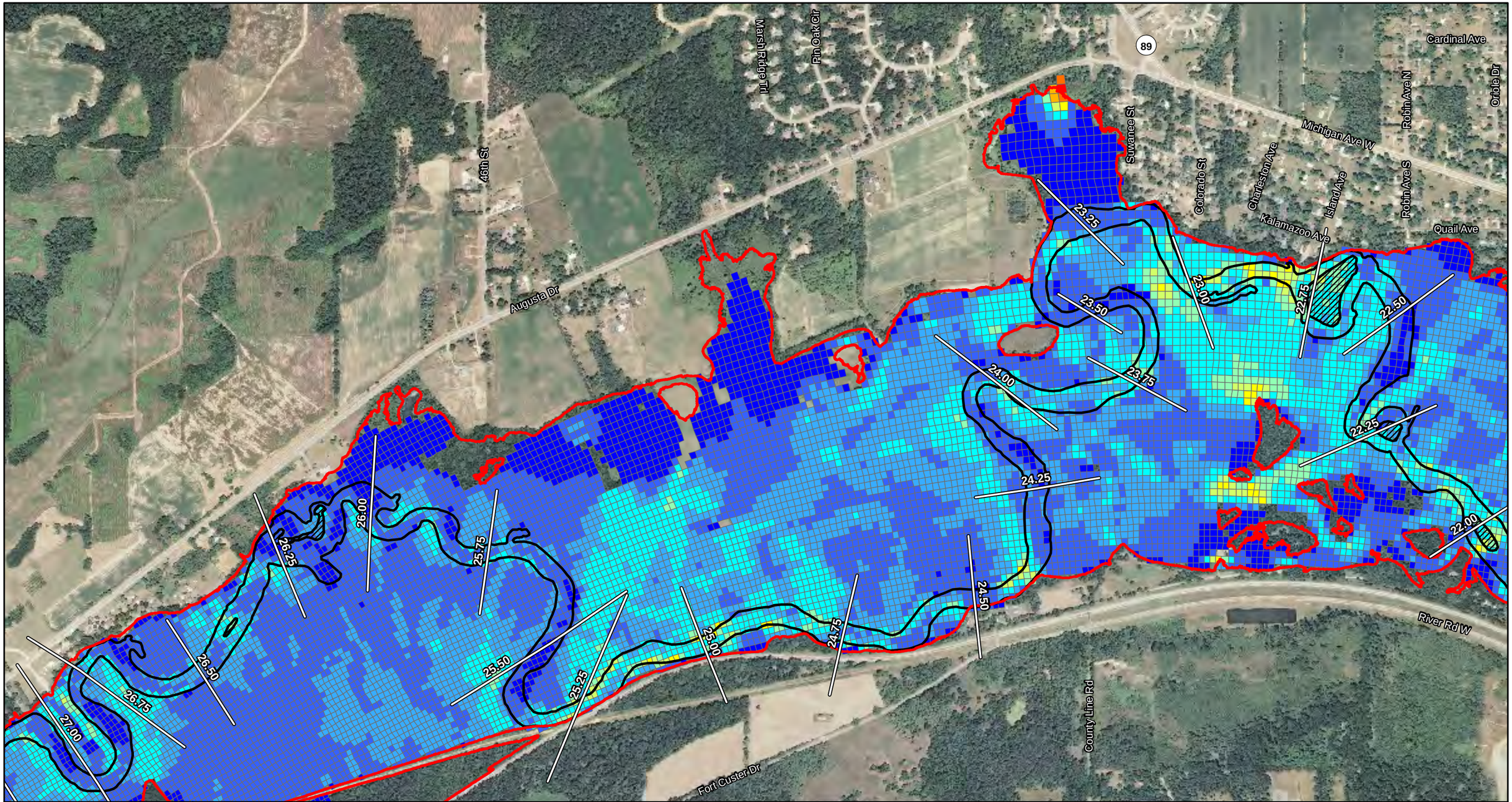
SHEET 9 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa)

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals

N

0 400 800 1,600

Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
100-YEAR FLOOD

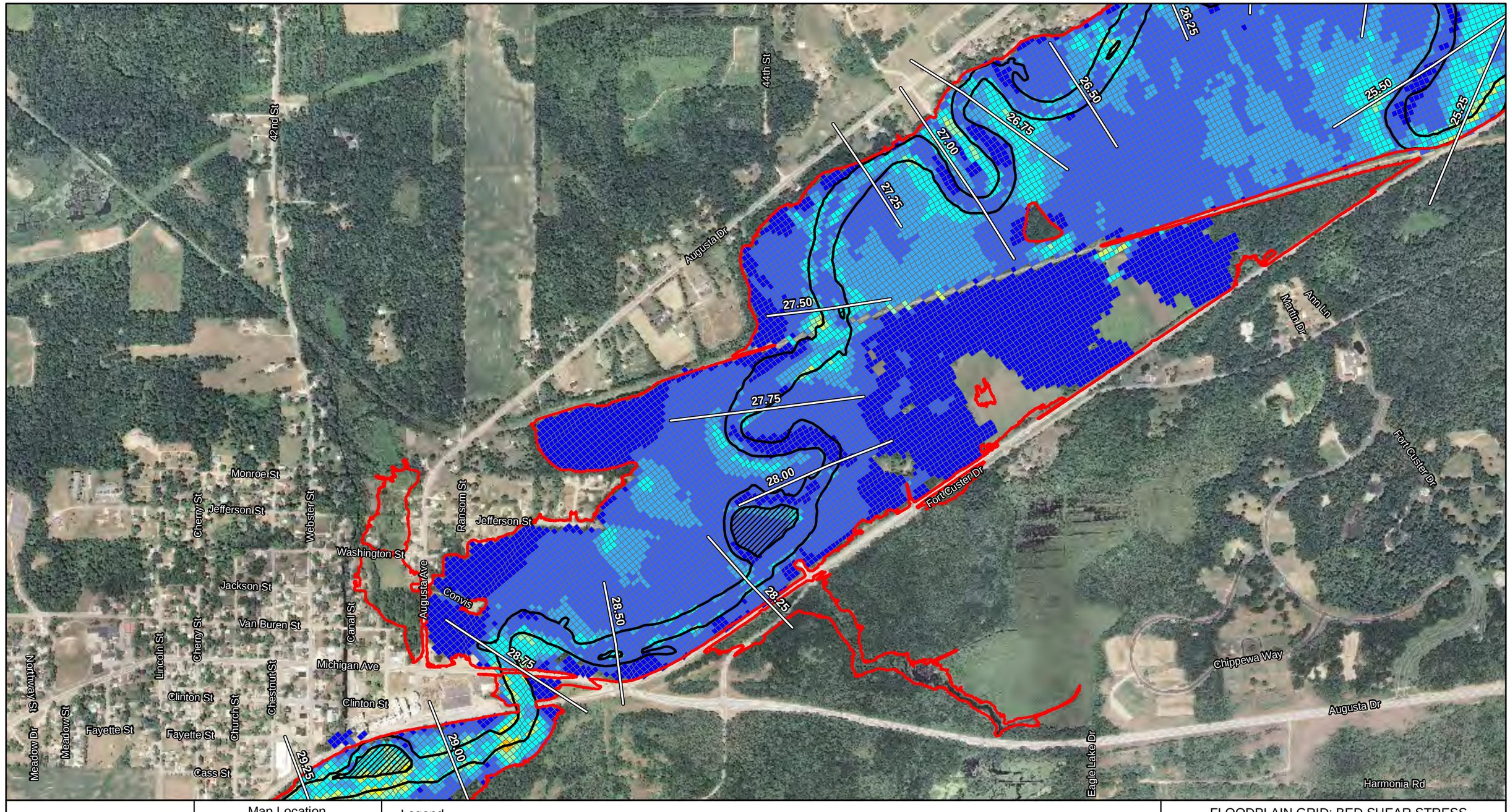
MP 22.50 - MP 27.00

SHEET 10 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_100yr.mxd

Aerial Photography Date: July & August 2009



Map Location



Legend

Bed Shear Stress (Pa)

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals

N

0 400 800 1,600

Scale in Feet

ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

FLOODPLAIN GRID: BED SHEAR STRESS
100-YEAR FLOOD

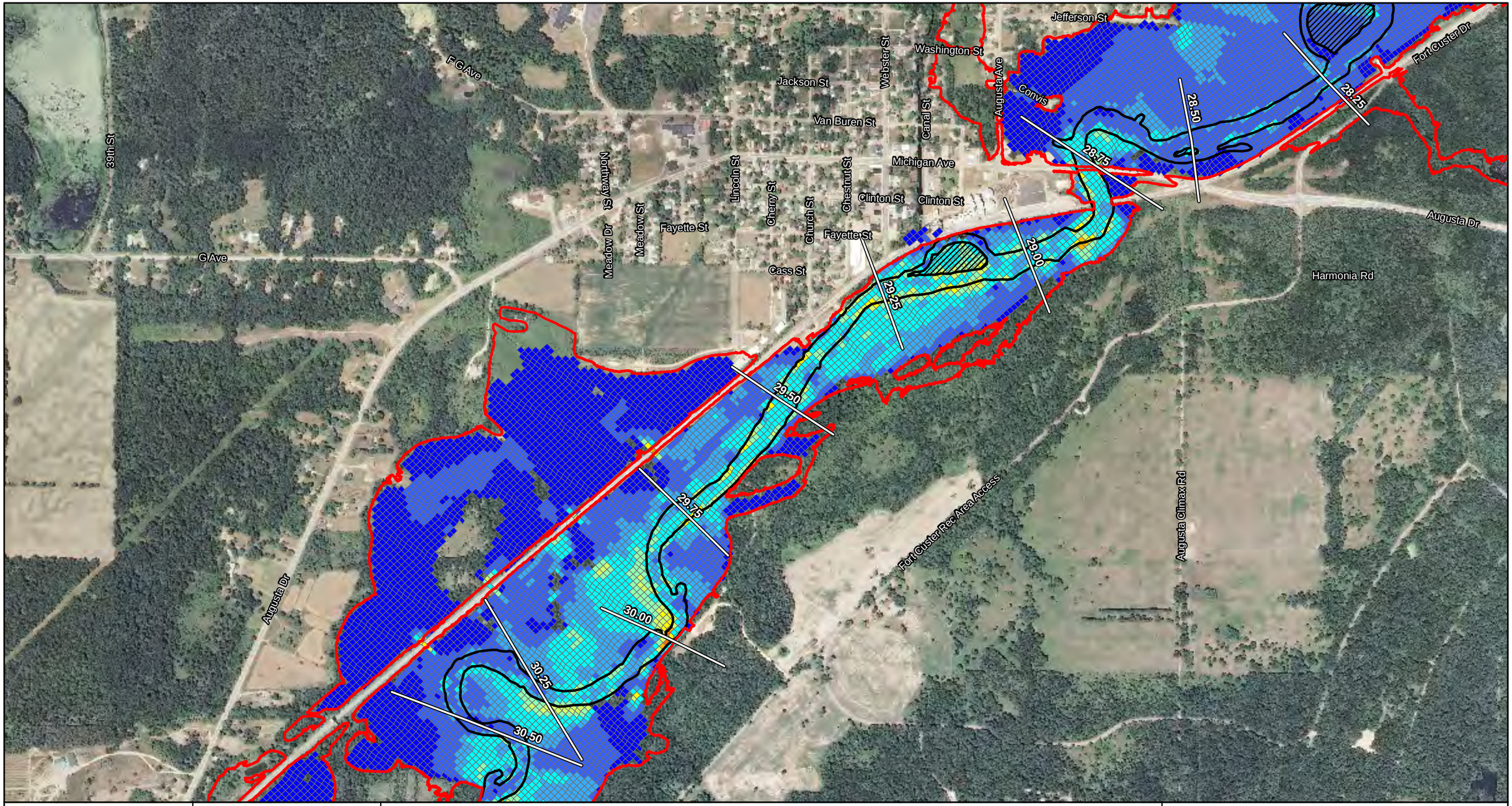
MP 27.00 - MP 28.75

SHEET 11 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_100yr.mxd

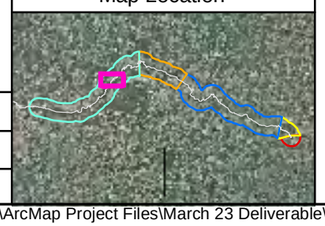
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa)

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals

N

0 400 800 1,600

Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
100-YEAR FLOOD

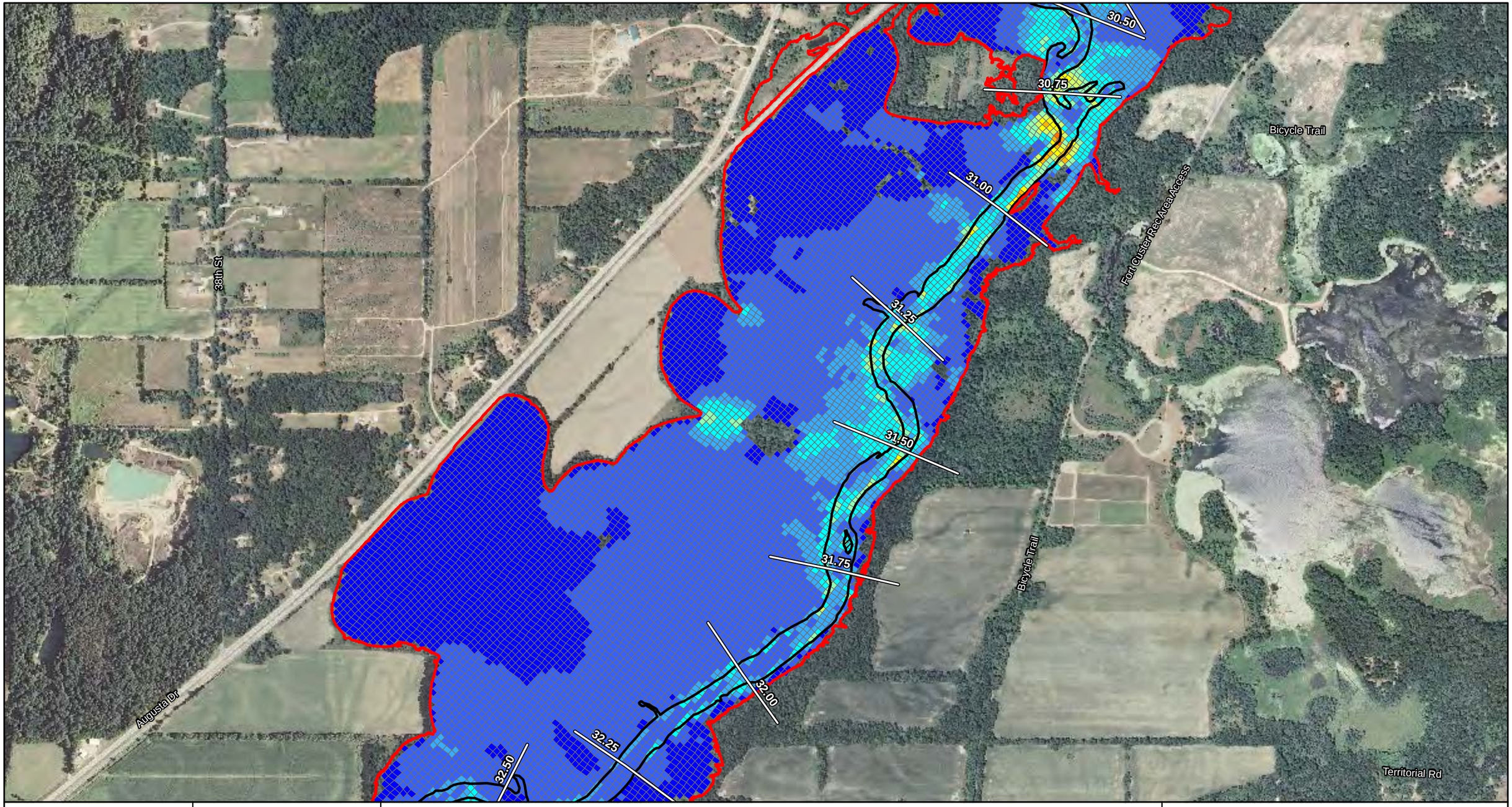
MP 28.75 - MP 30.50

SHEET 12 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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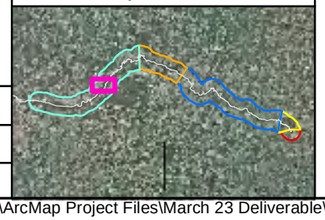
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa)

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals

N

0 400 800 1,600

Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
100-YEAR FLOOD

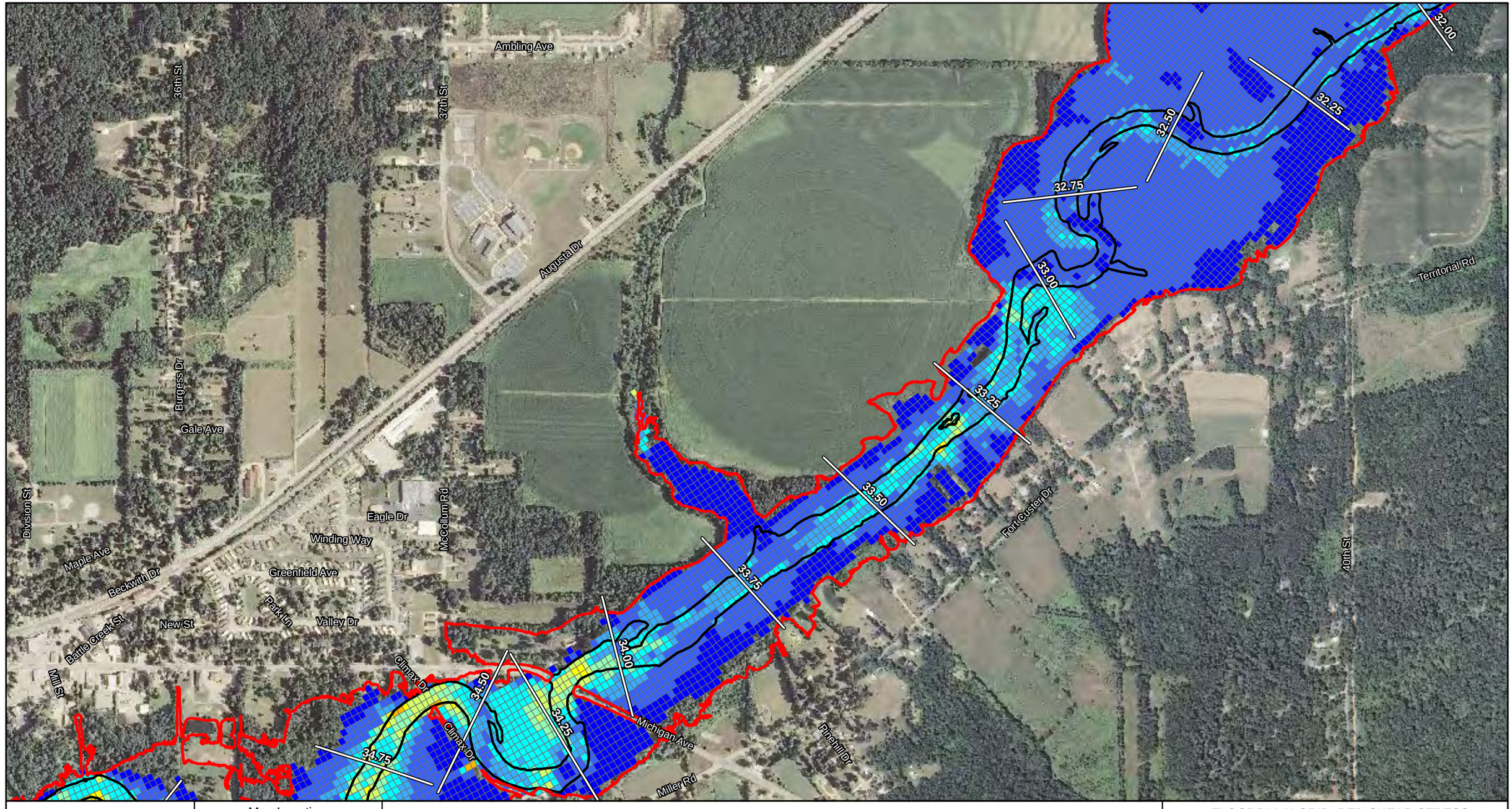
MP 30.50 - MP 32.25

SHEET 13 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_100yr.mxd

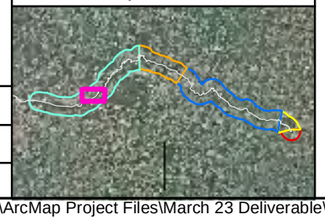
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa)

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals

N

0 400 800 1,600

Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
100-YEAR FLOOD

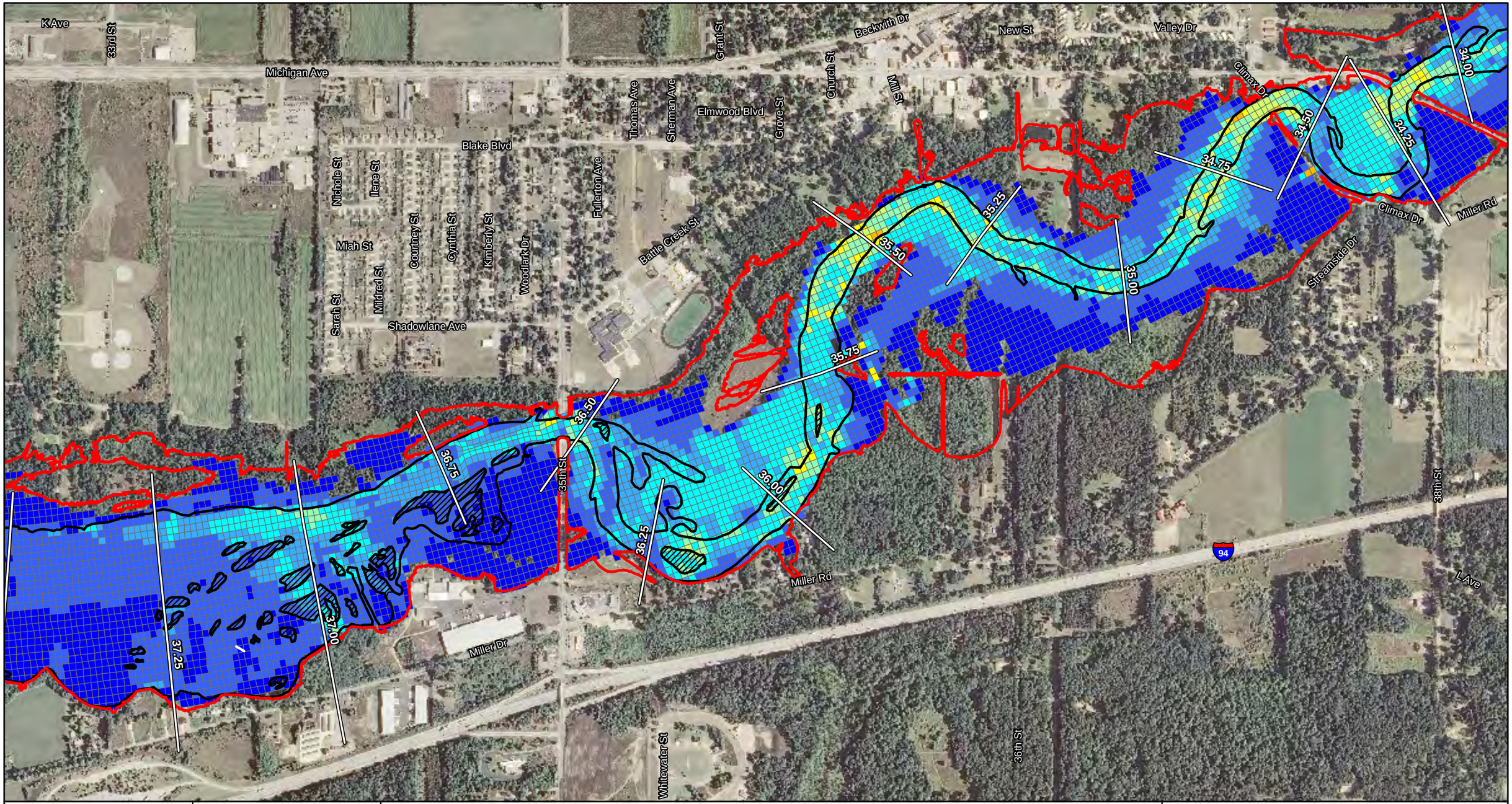
MP 32.25 - MP 34.75

SHEET 14 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_100yr.mxd

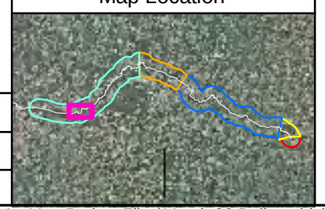
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa)

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

Pa = Pascals

N

0 400 800 1,600

Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
100-YEAR FLOOD

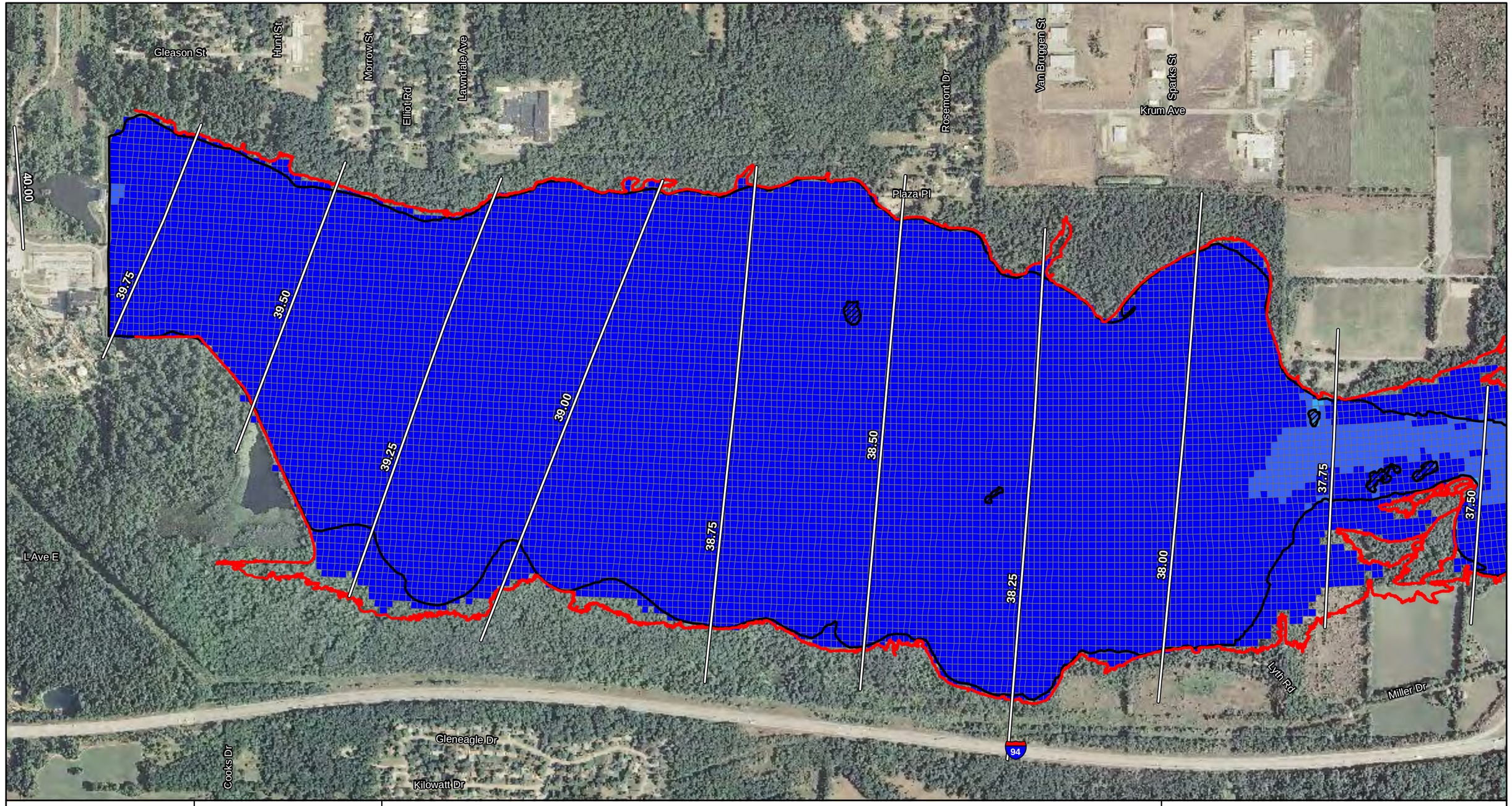
MP 34.25 - MP 37.50

SHEET 15 OF 16

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Bed_Shear_Stress_100yr.mxd

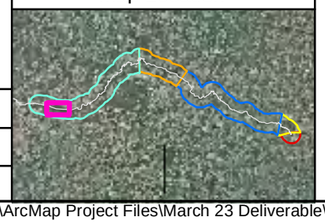
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 3/23/2012
Approved:	DBR 3/23/2012
Project #:	106-4186

Map Location



Legend

Bed Shear Stress (Pa)

- < 1.000001
- 1.000001 - 3.000000
- 3.000001 - 5.000000
- 5.000001 - 10.000000
- 10.000001 - 15.000000
- 15.000001 - 20.000000
- 20.000001 - 30.000000
- 30.000001 - 50.000000
- 50.000001 - 100.000000
- > 100.000000

Channel Bankline
Island Bankline
HEC-RAS 100-Year Floodplain
Quarter Mile Grid Segment

Pa = Pascals

N

0 400 800 1,600

Scale in Feet

FLOODPLAIN GRID: BED SHEAR STRESS
100-YEAR FLOOD

MP 37.50 - MP 40.00

SHEET 16 OF 16

ENBRIDGE LINE 6B MP 608
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Aerial Photography Date: July & August 2009

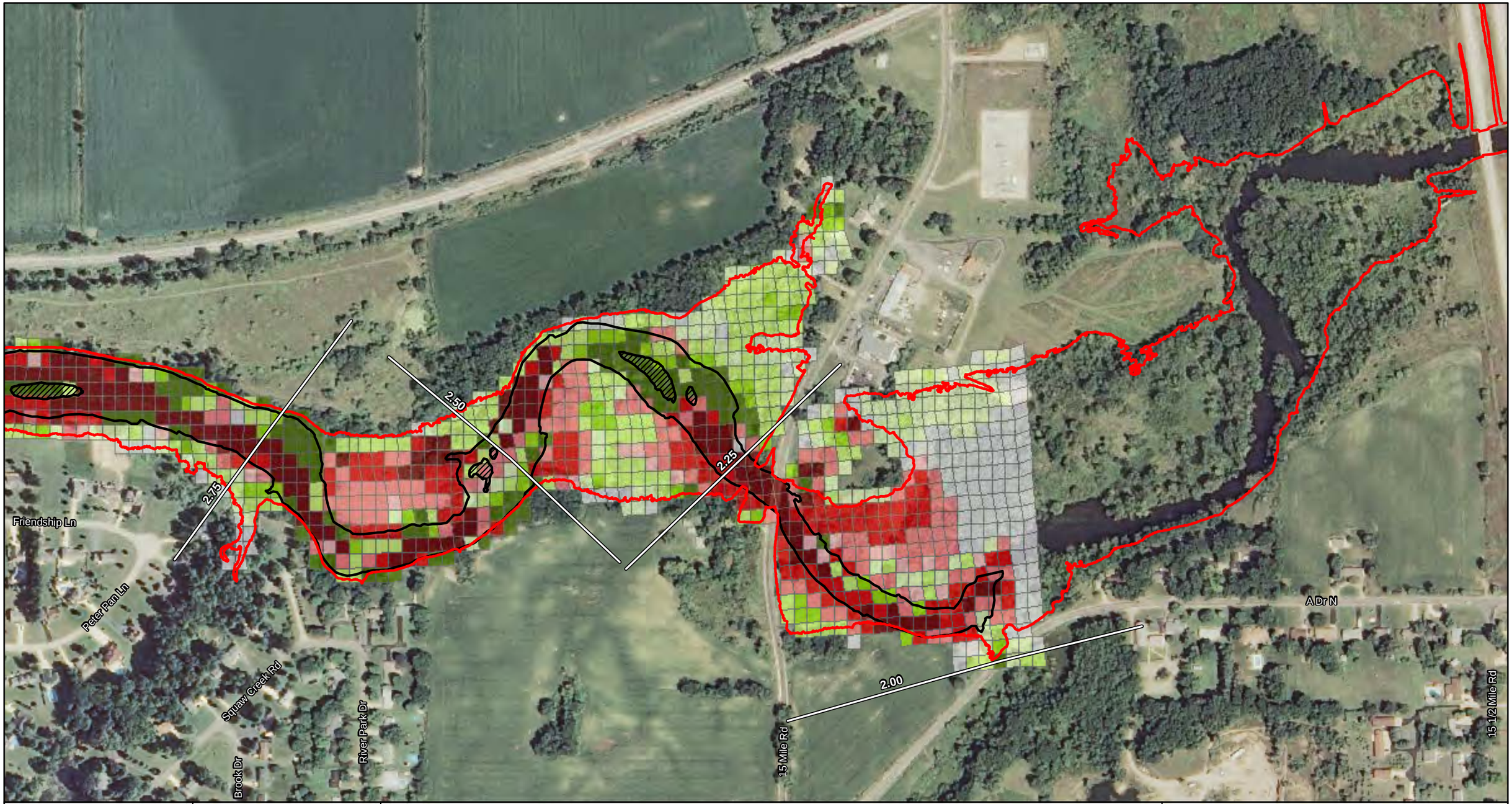
Figure 6-14

Floodplain Grid: Sedimentation Rate

All Grid Cells

100-Year Flood

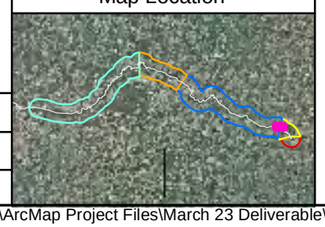
Sheets 1 through 45



ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

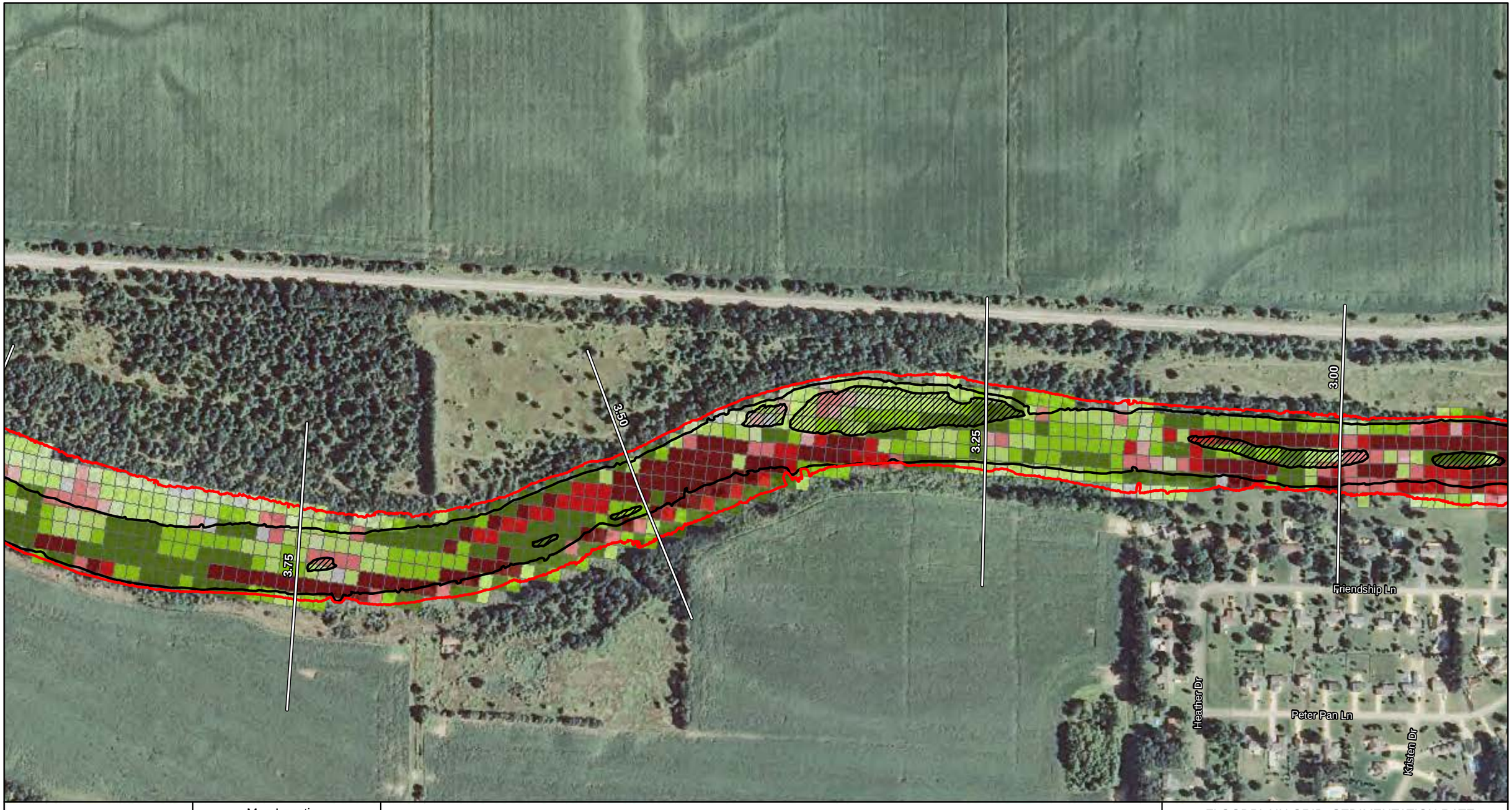
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 01.88 - MP 02.91

SHEET 1 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Sedimentation_Rate_100yr.mxd

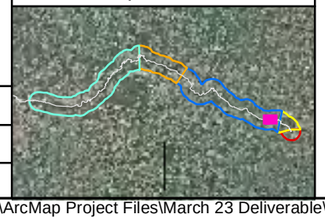
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

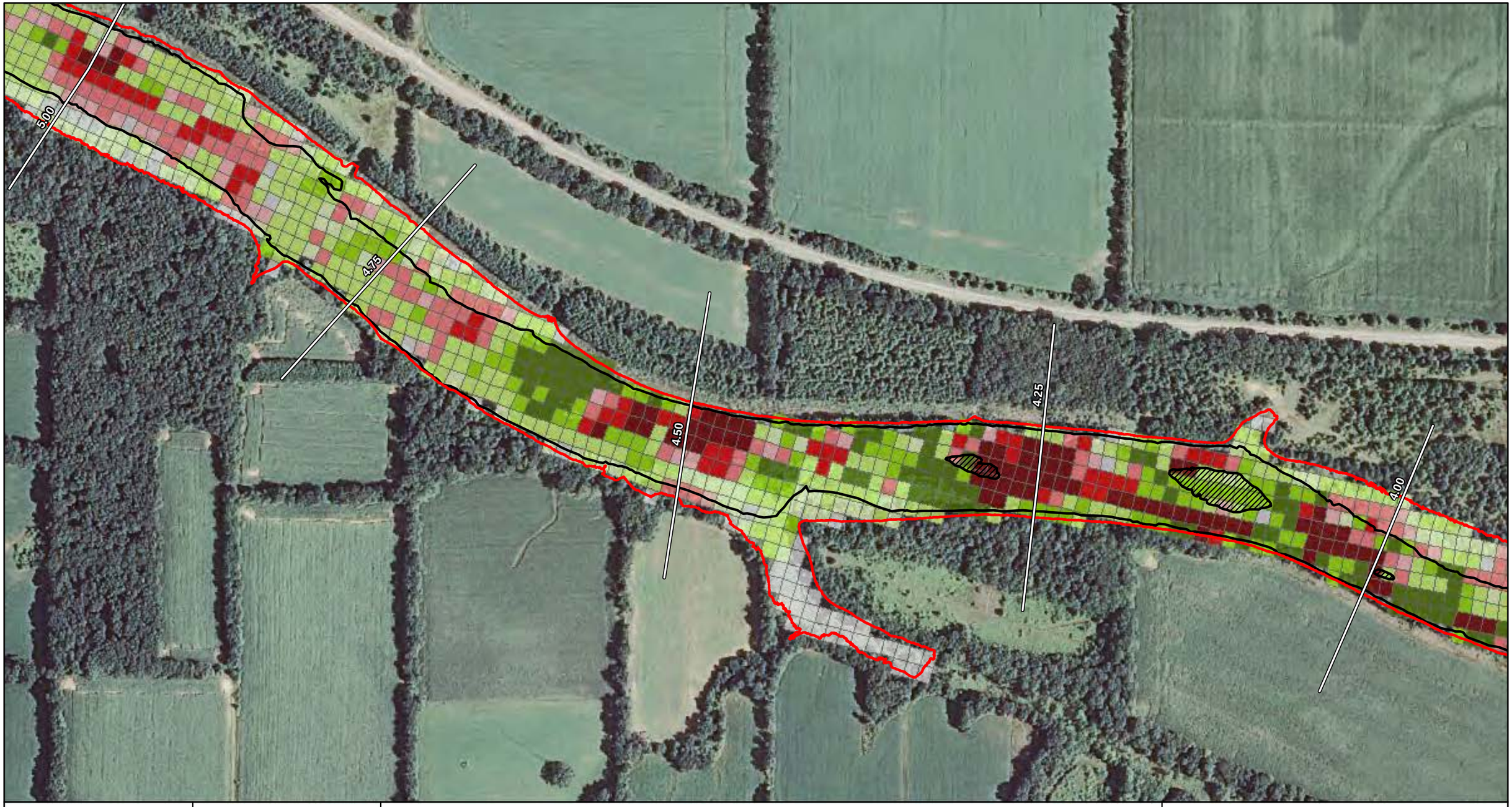
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 02.91 - MP 03.93

SHEET 2 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Sedimentation_Rate_100yr.mxd

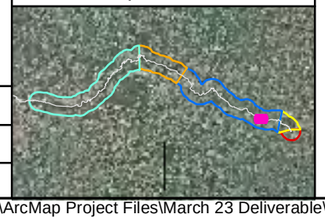
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 03.93 - MP 04.98

SHEET 3 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn: BRS 4/2/2012

Approved: DBR 4/2/2012

Project #: 106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 04.98 - MP 06.03

SHEET 4 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
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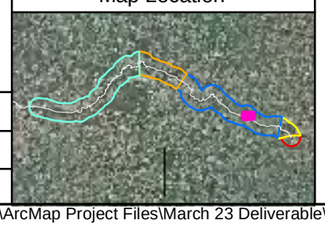
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

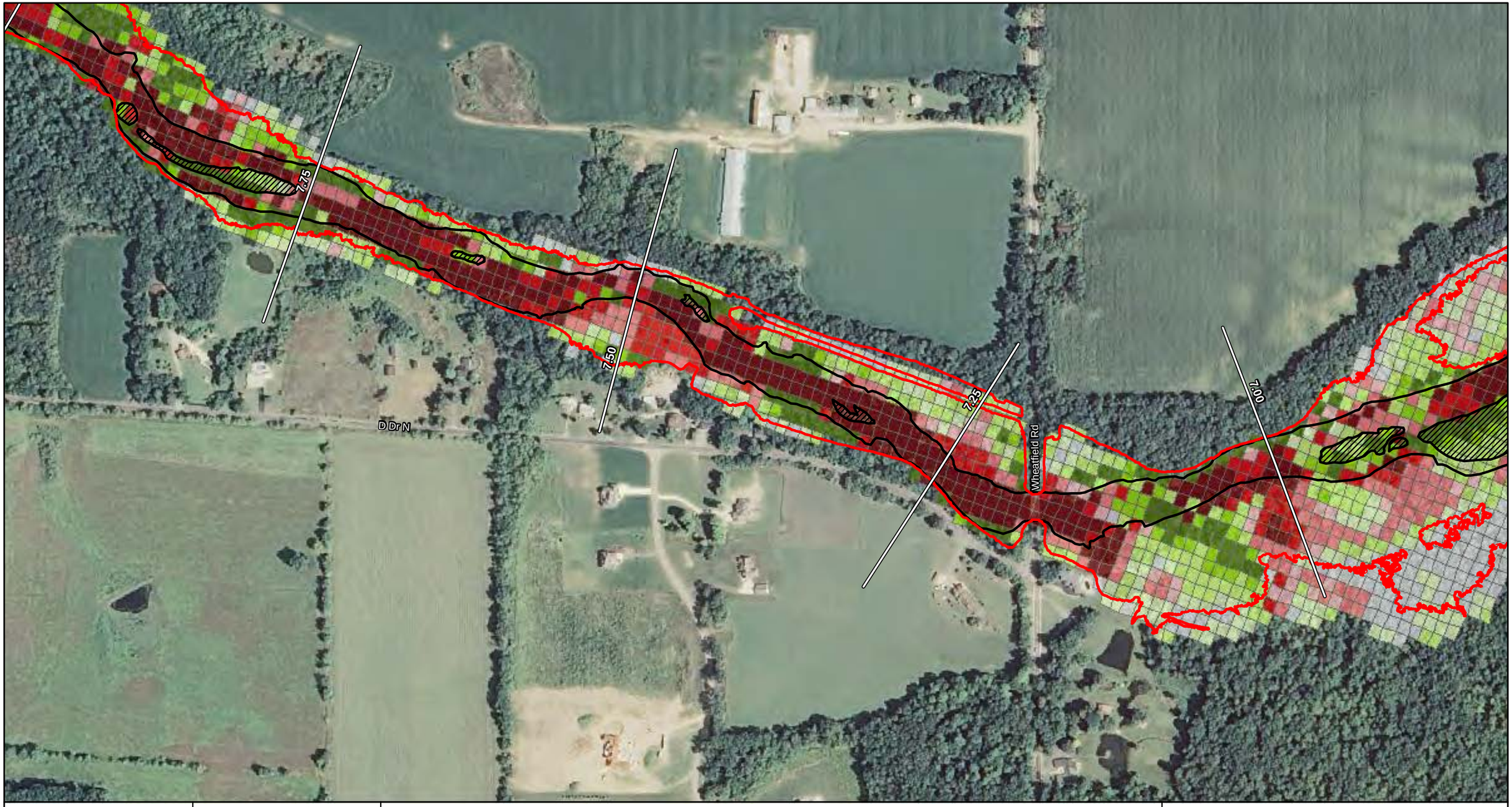
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 06.03 - MP 06.85

SHEET 5 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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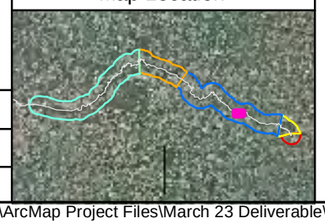
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 06.85 - MP 07.95

SHEET 6 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

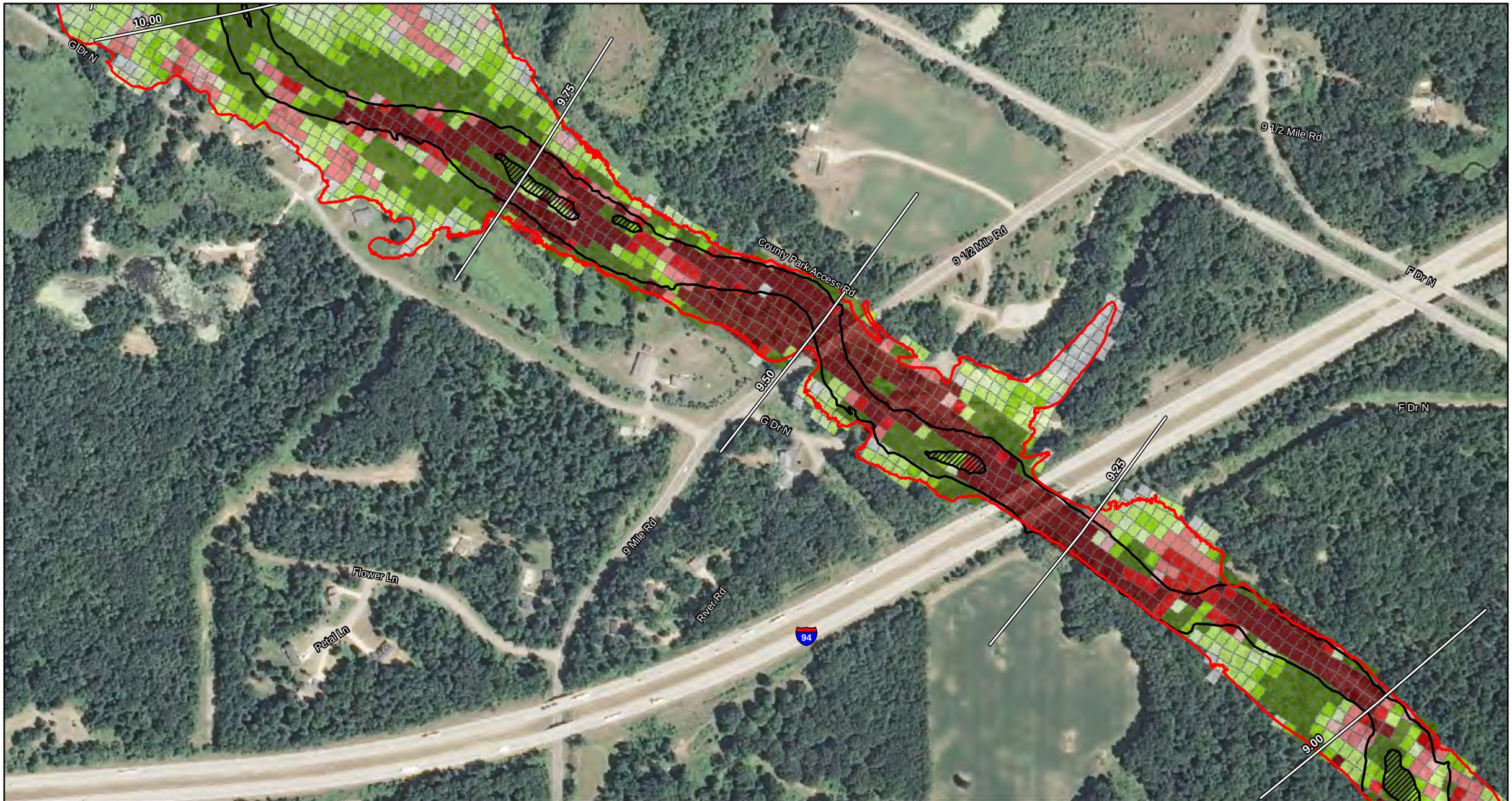
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 07.95 - MP 08.93

SHEET 7 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

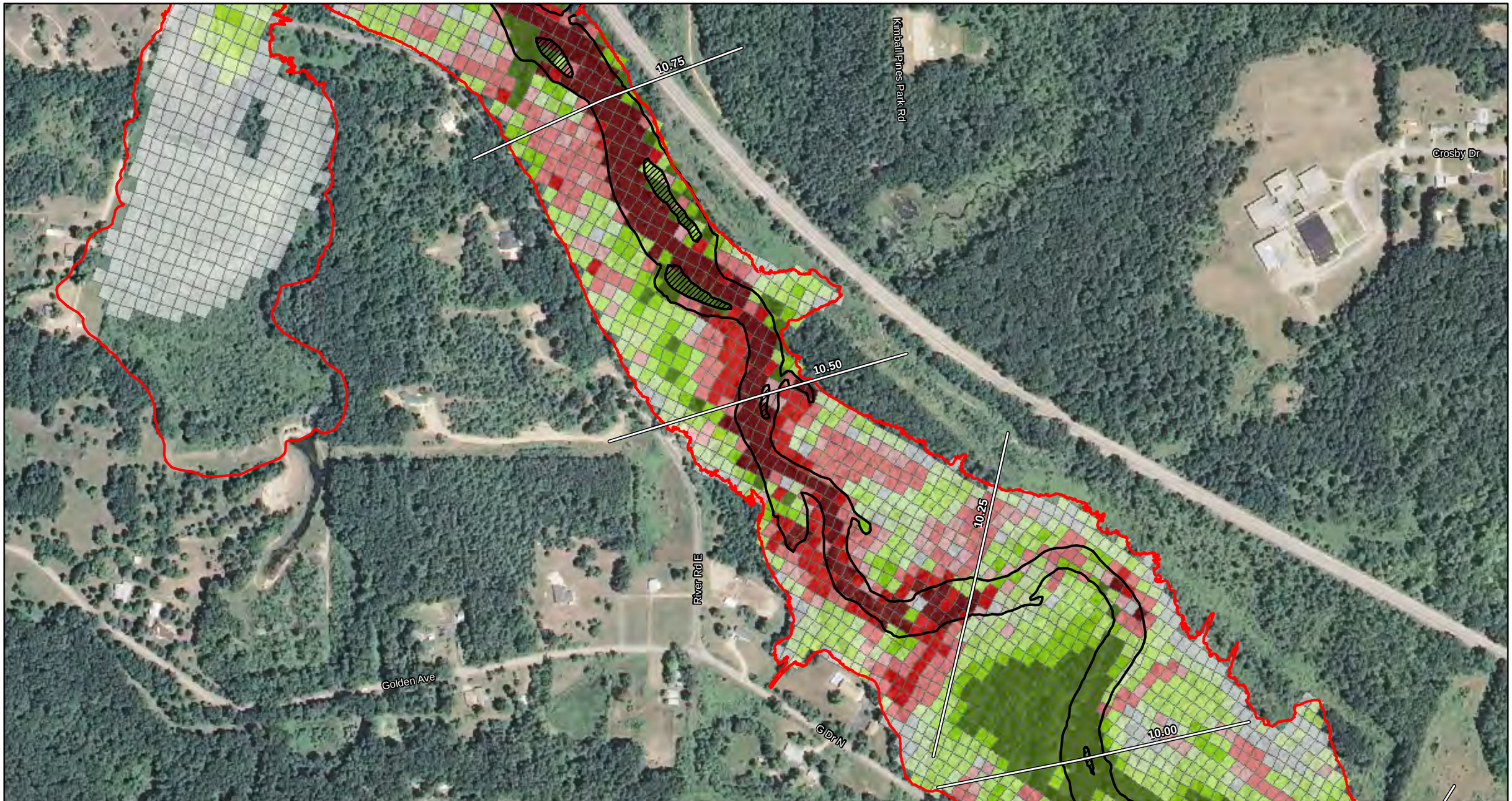
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 08.93 - MP 10.00

SHEET 8 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Sedimentation_Rate_100yr.mxd

Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

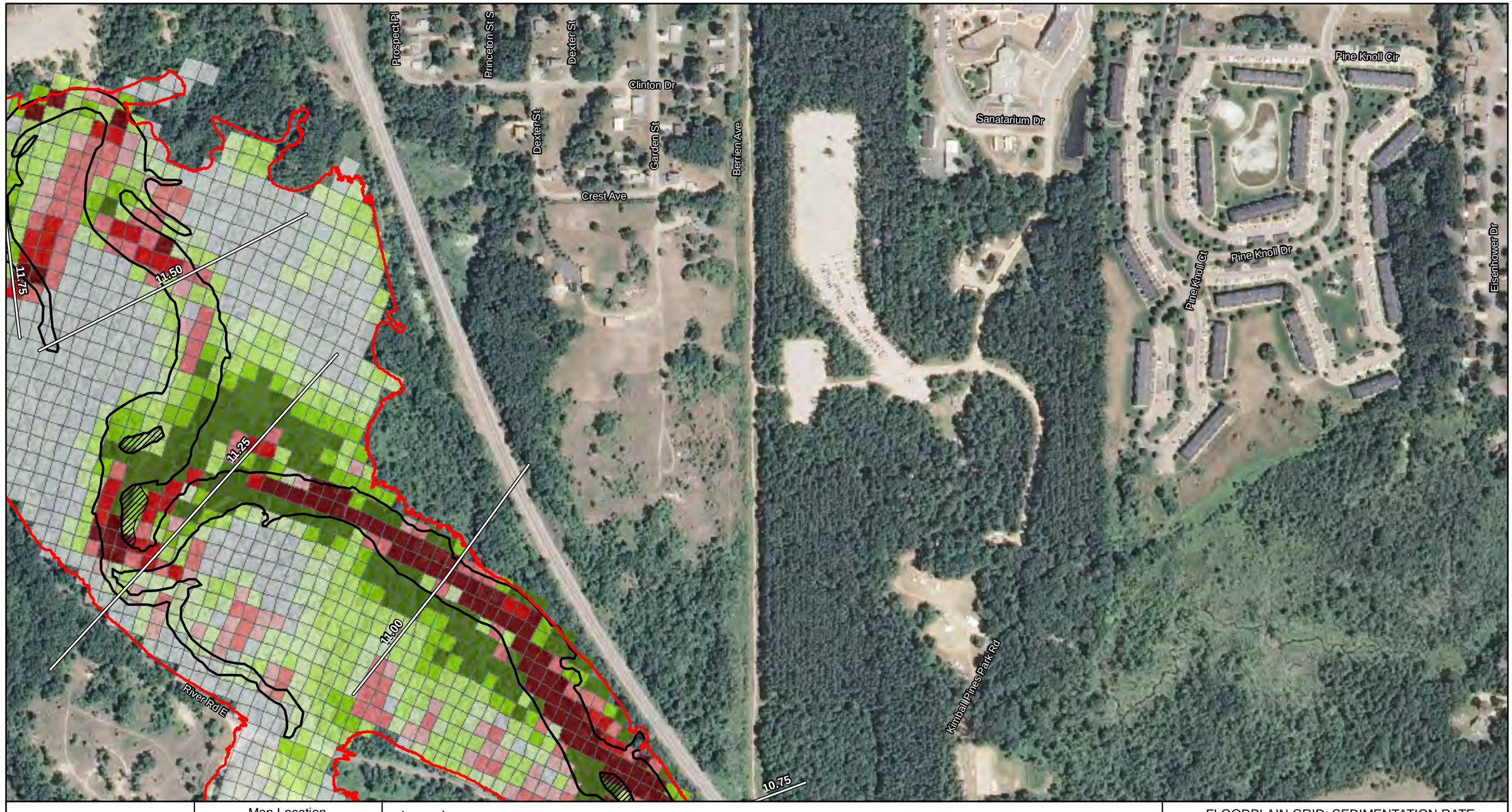
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 10.00 - MP 10.80

SHEET 9 OF 45

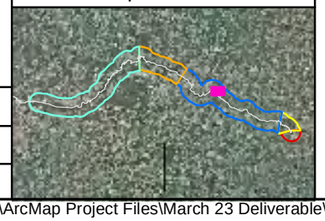
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

X:\Hydrodynamic Model Data Transfer\ArcMap Project Files\March 23 Deliverable\Floodplain_Sedimentation_Rate_100yr.mxd

Aerial Photography Date: July & August 2009



Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
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- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

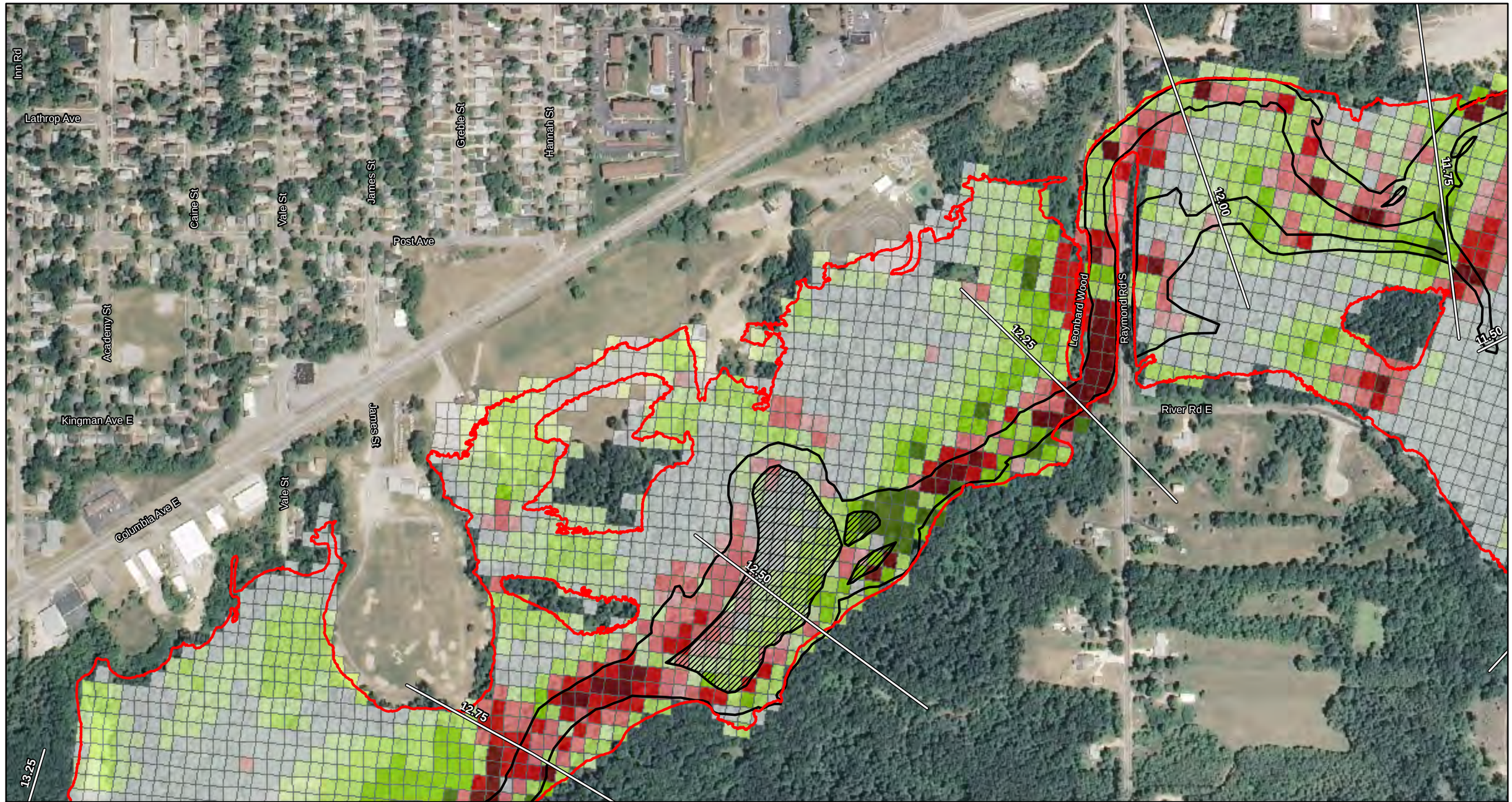
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 10.80 - MP 11.70

SHEET 10 OF 45

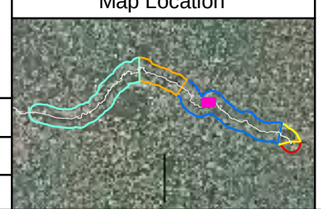
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

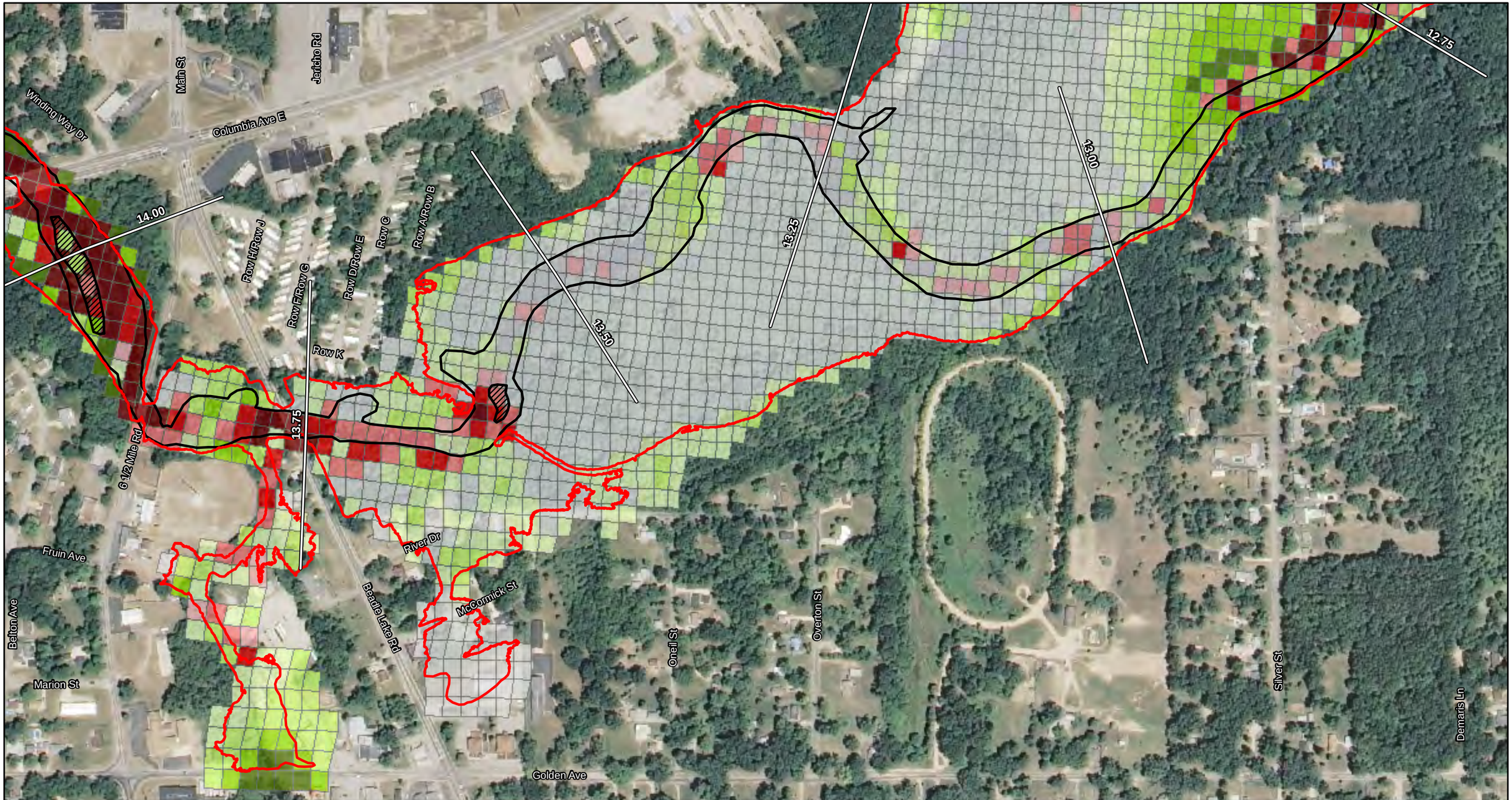
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 11.70 - MP 12.77

SHEET 11 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 12.77 - MP 14.00

SHEET 12 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

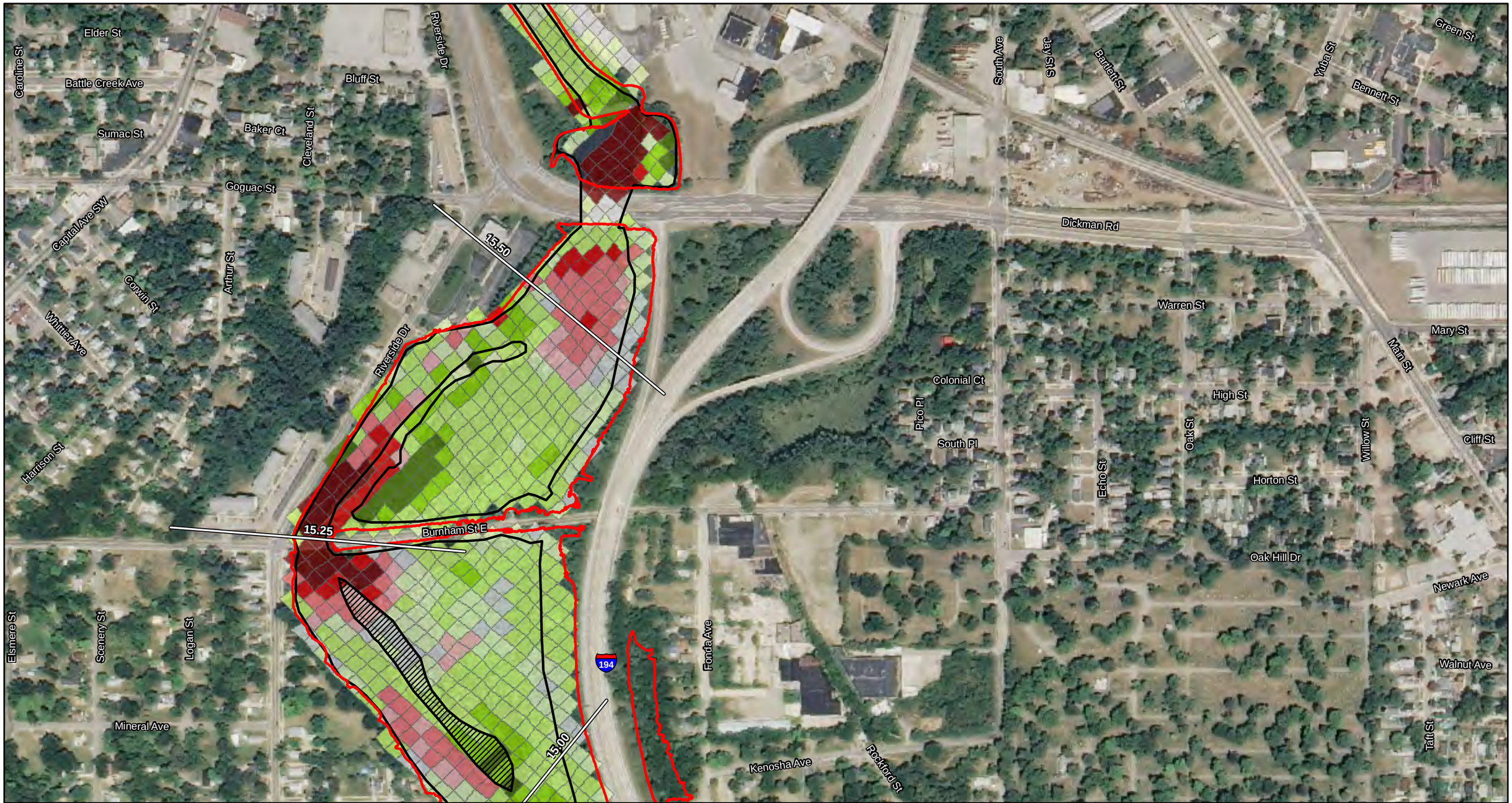
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 14.00 - MP 15.05

SHEET 13 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 15.05 - MP 15.71

SHEET 14 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
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Aerial Photography Date: July & August 2009



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Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

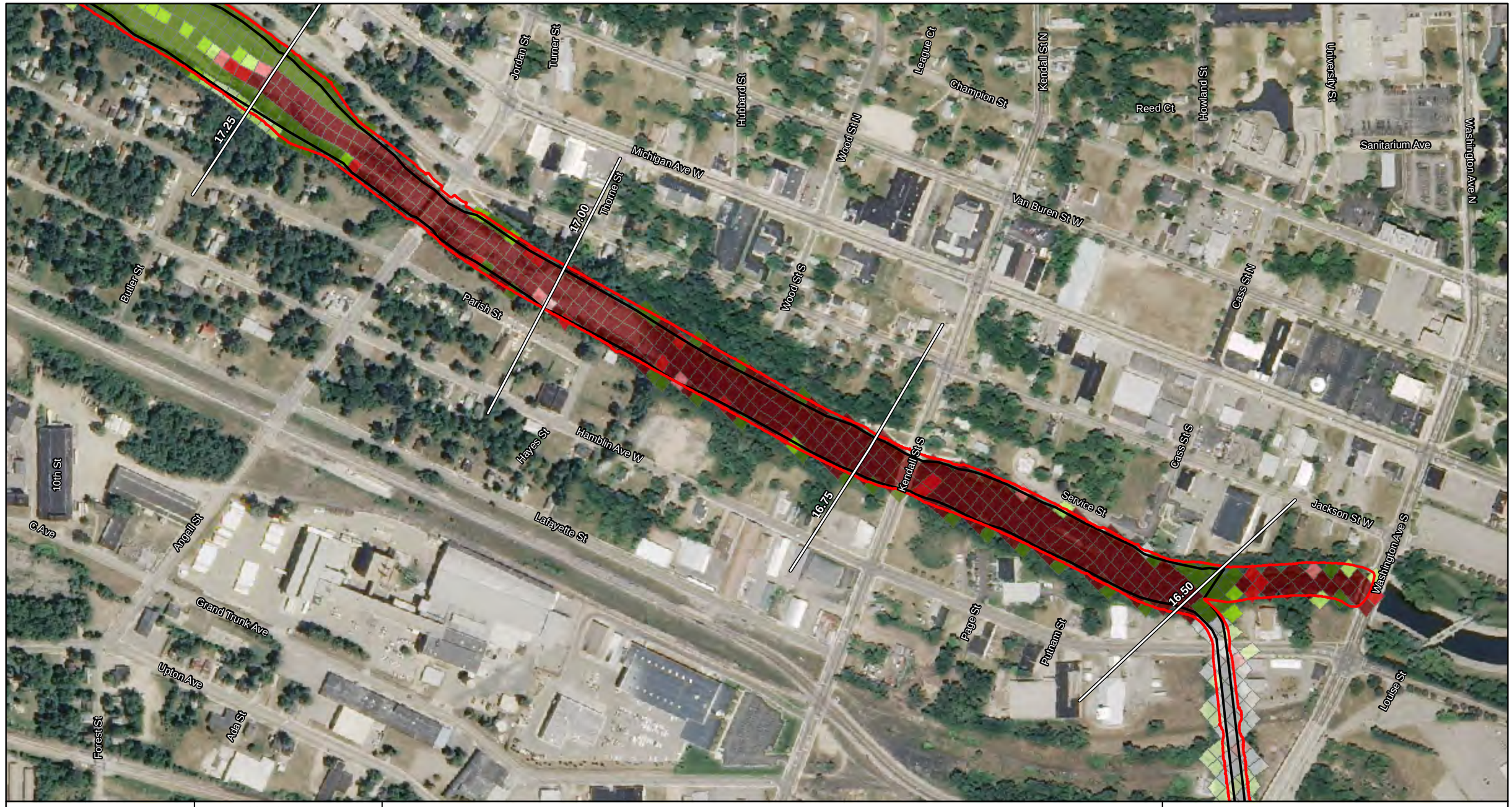
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 15.71 - MP 16.38

SHEET 15 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



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Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 16.38 - MP 17.30

SHEET 16 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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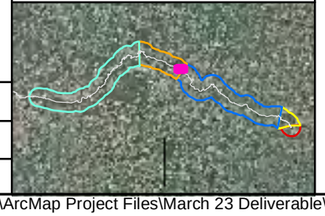
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 17.30 - MP 18.11

SHEET 17 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

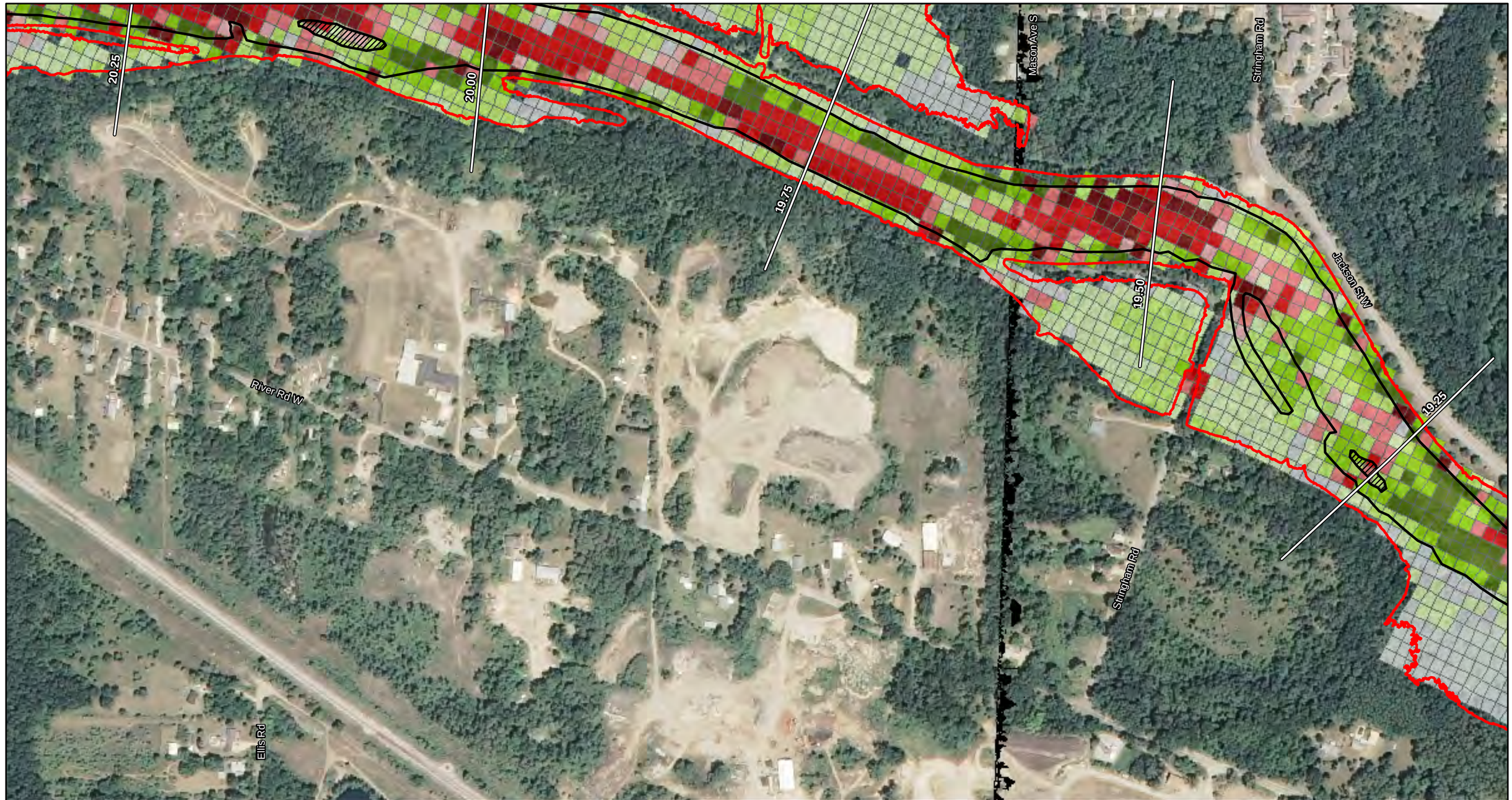
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 18.11 - MP 19.18

SHEET 18 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

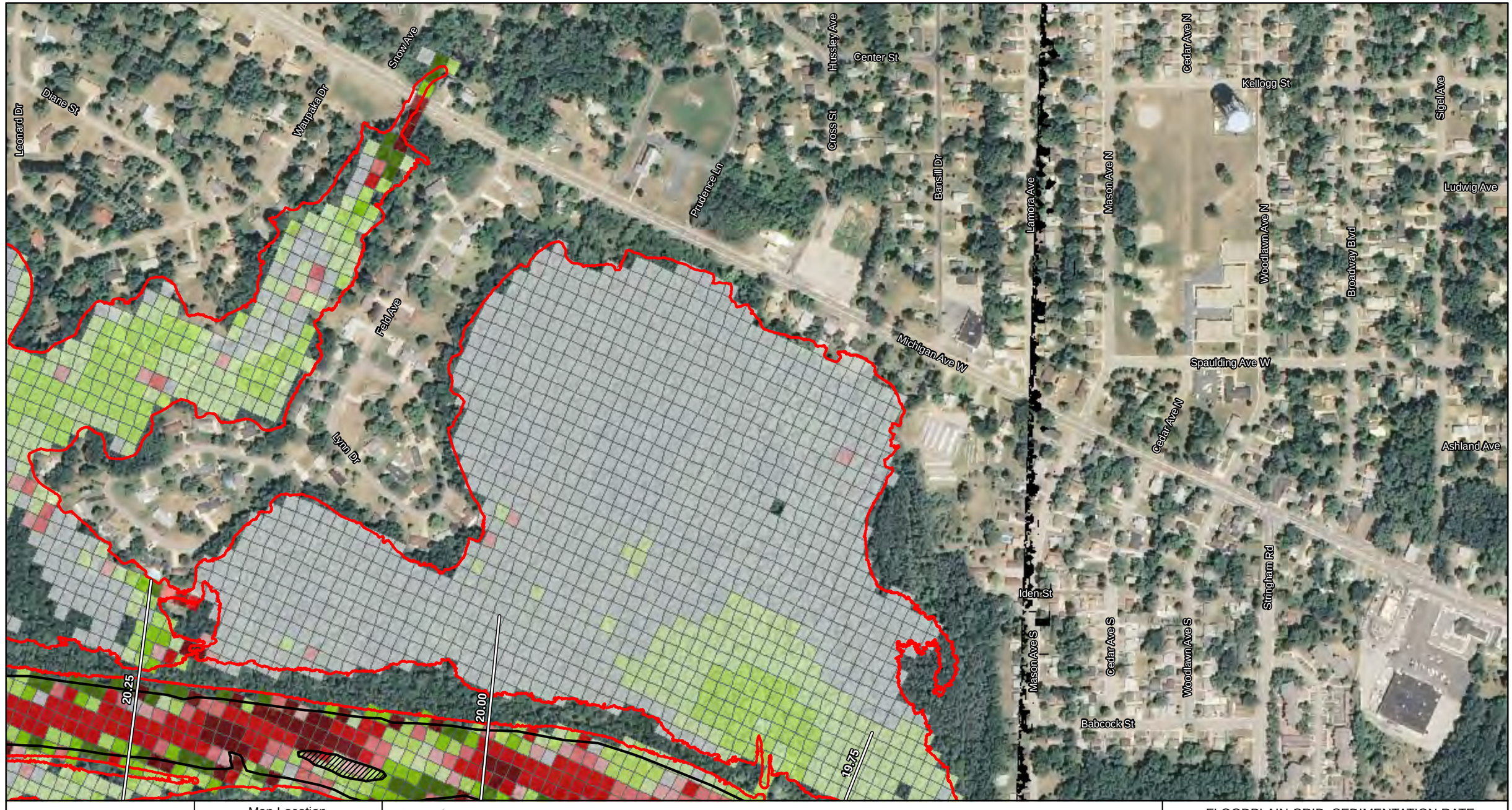
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 19.18 - MP 20.00

SHEET 19 OF 45

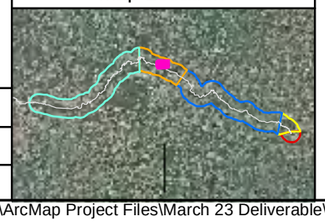
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
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- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

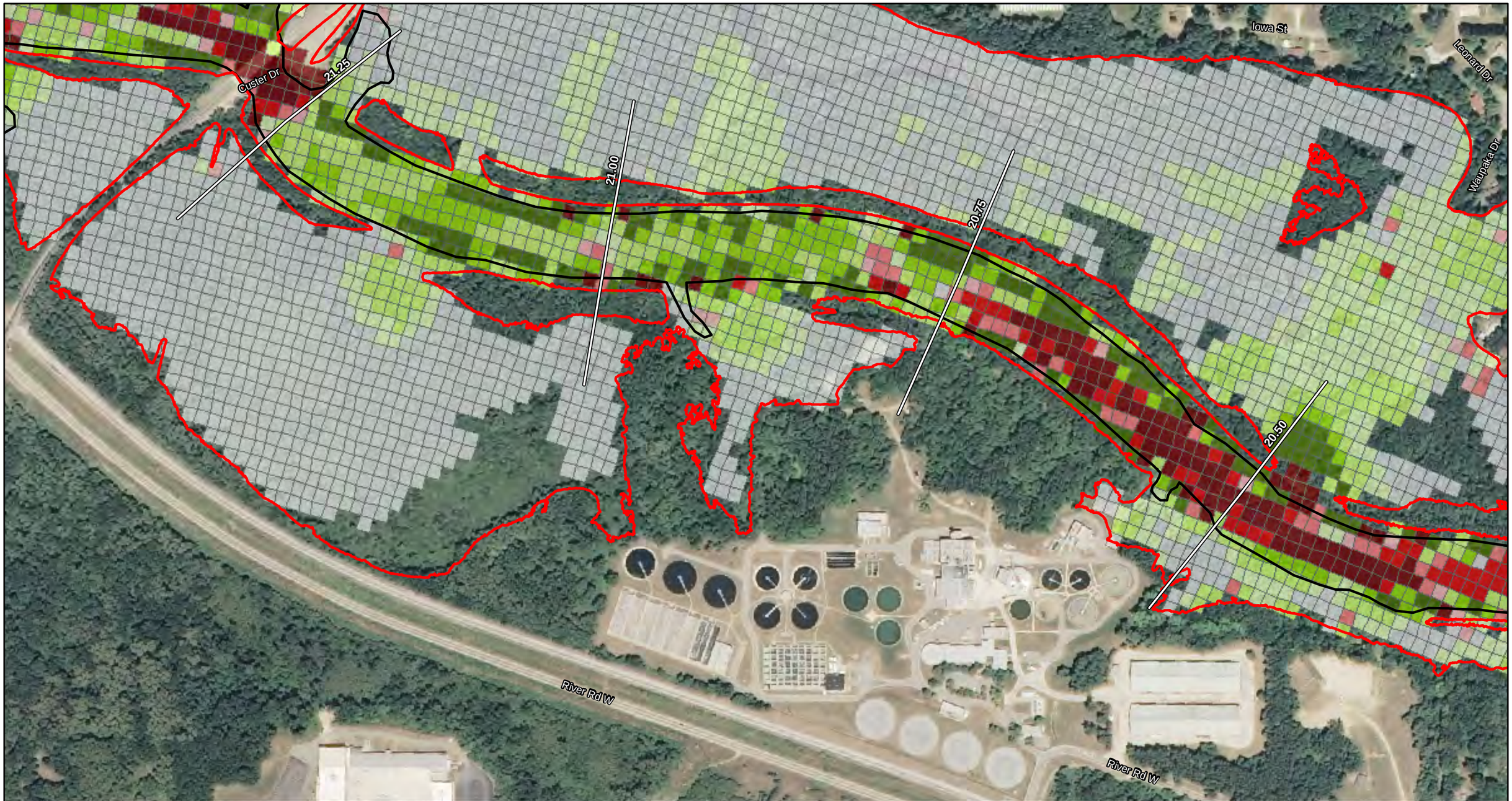
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 20.00 - MP 20.32

SHEET 20 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 20.32 - MP 21.36

SHEET 21 OF 45

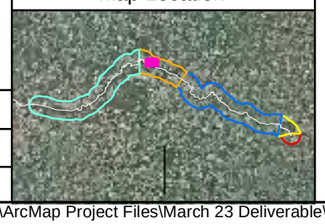
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

ENBRIDGE

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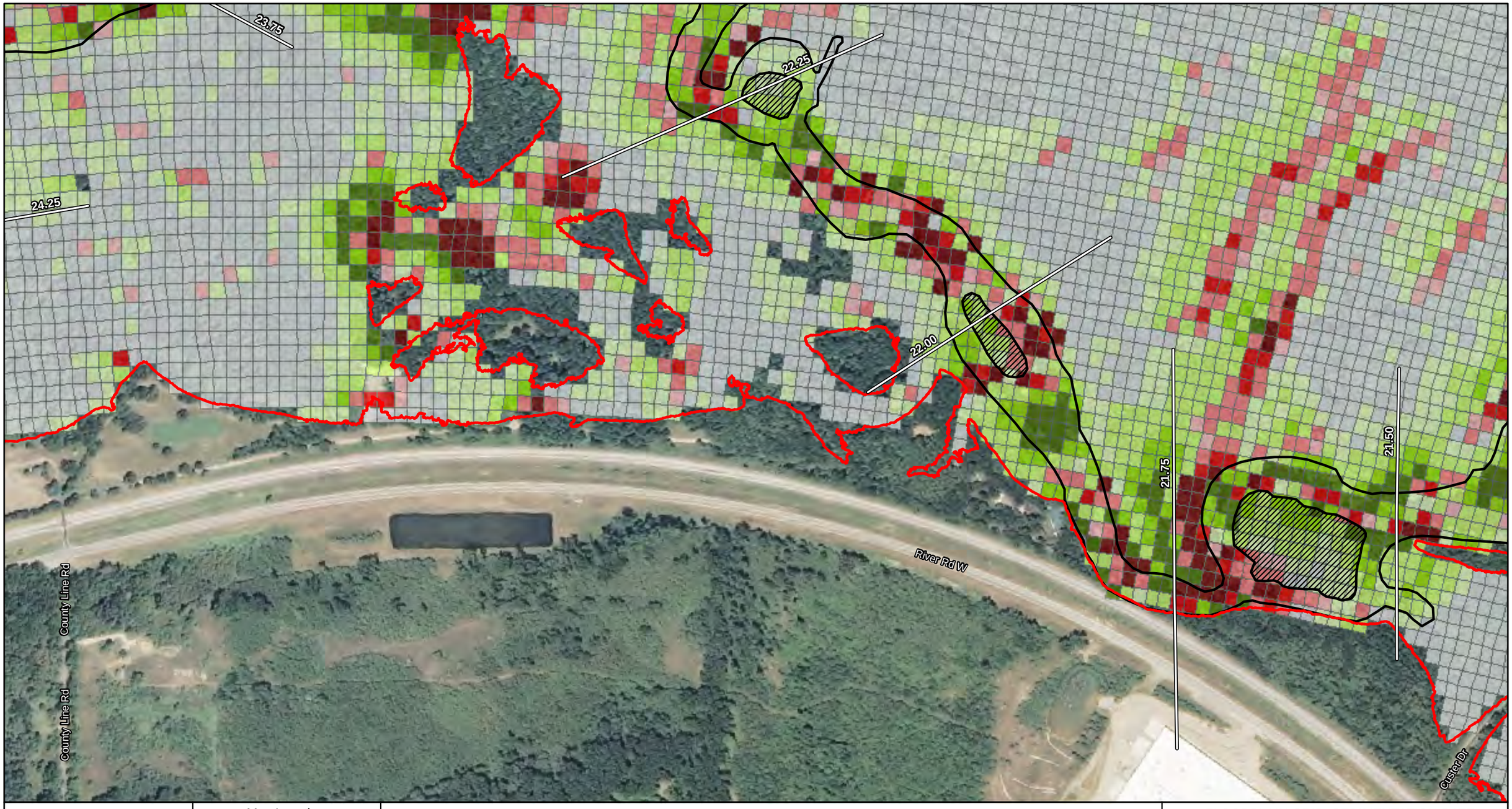
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 21.36 - MP 21.59

SHEET 22 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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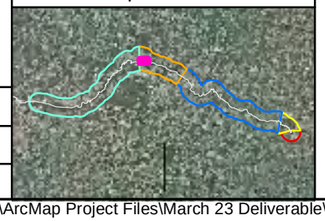
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

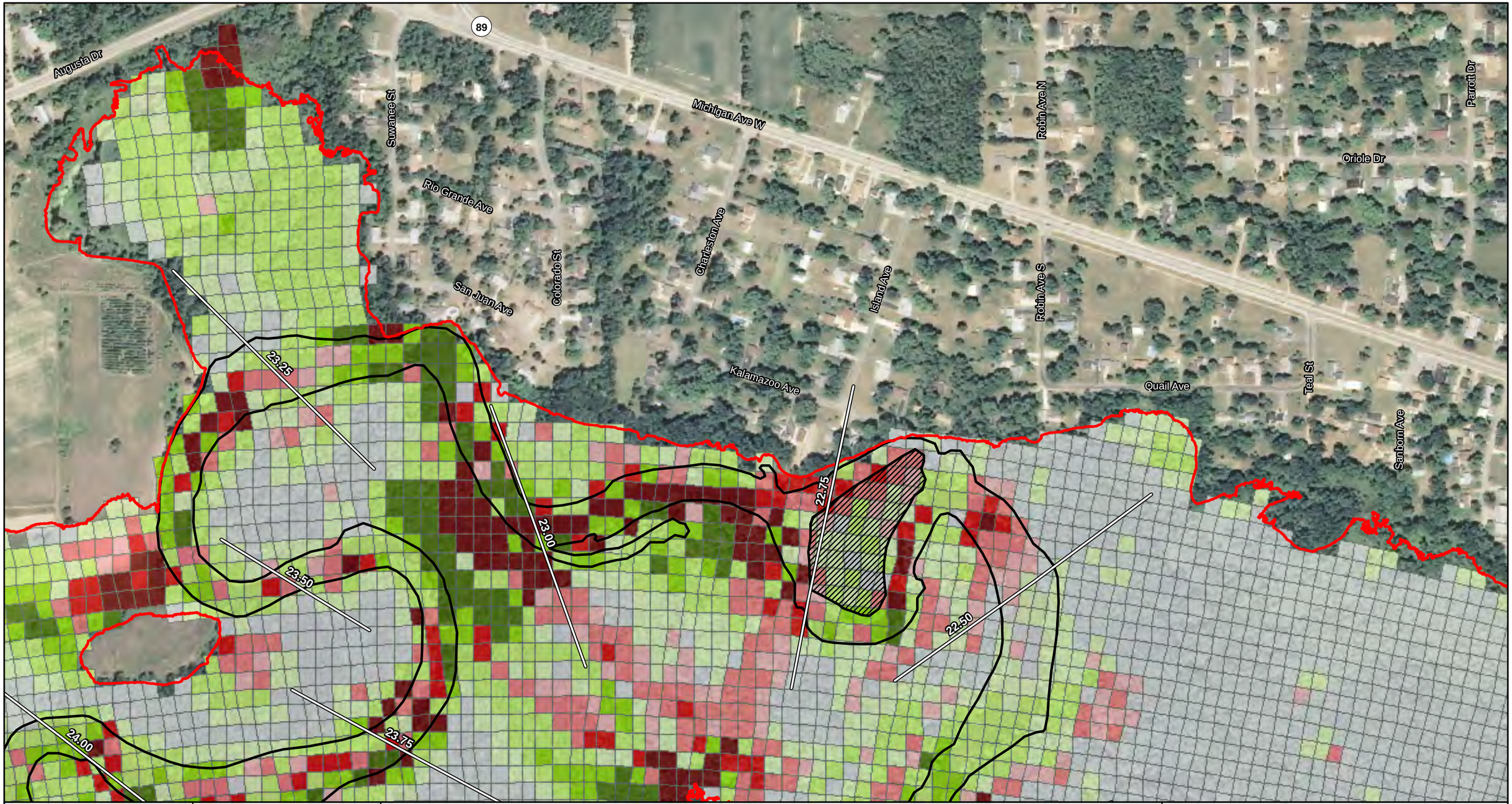
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 21.59 - MP 22.33

SHEET 23 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

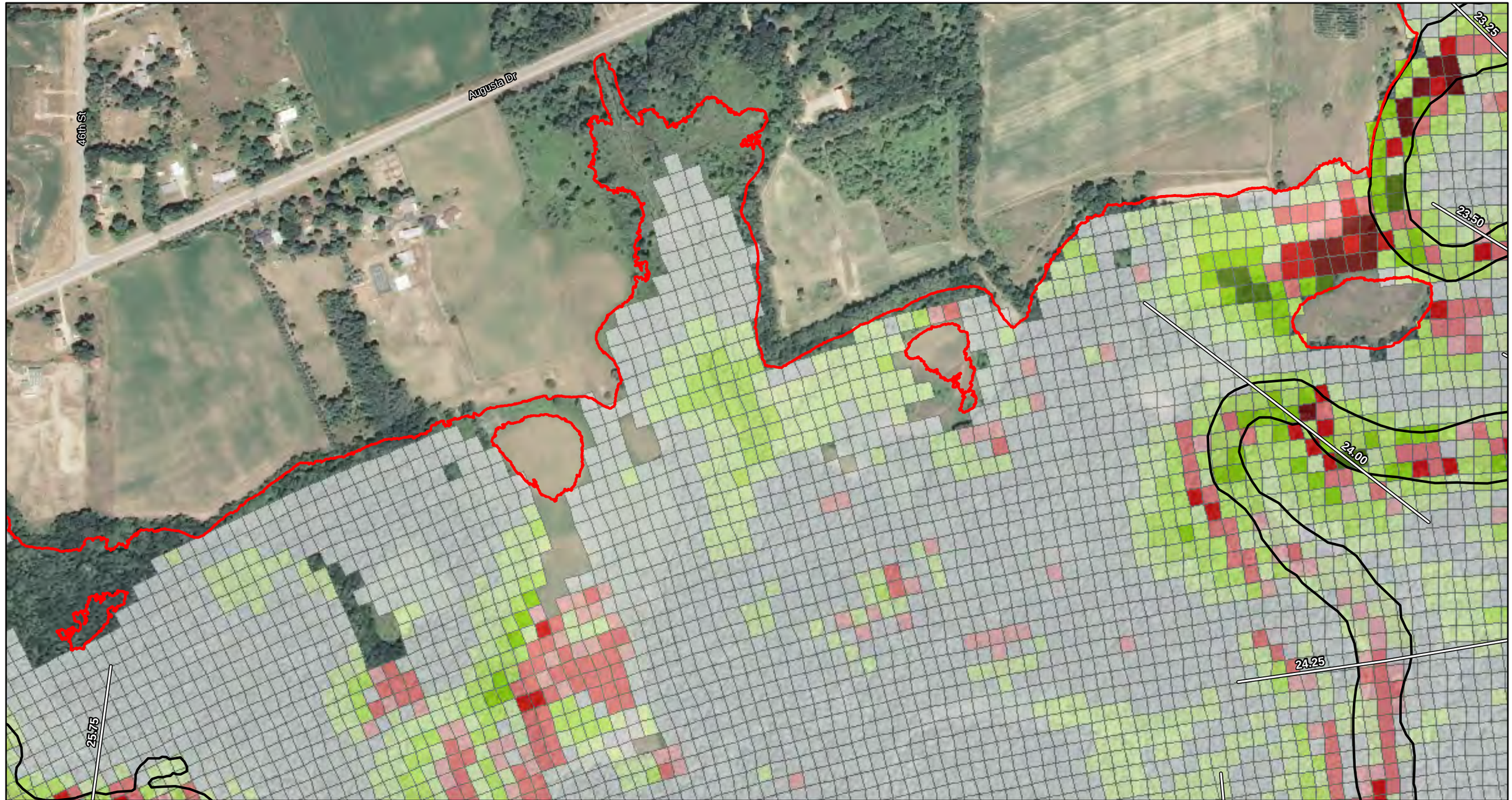
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 22.33 - MP 24.01

SHEET 24 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

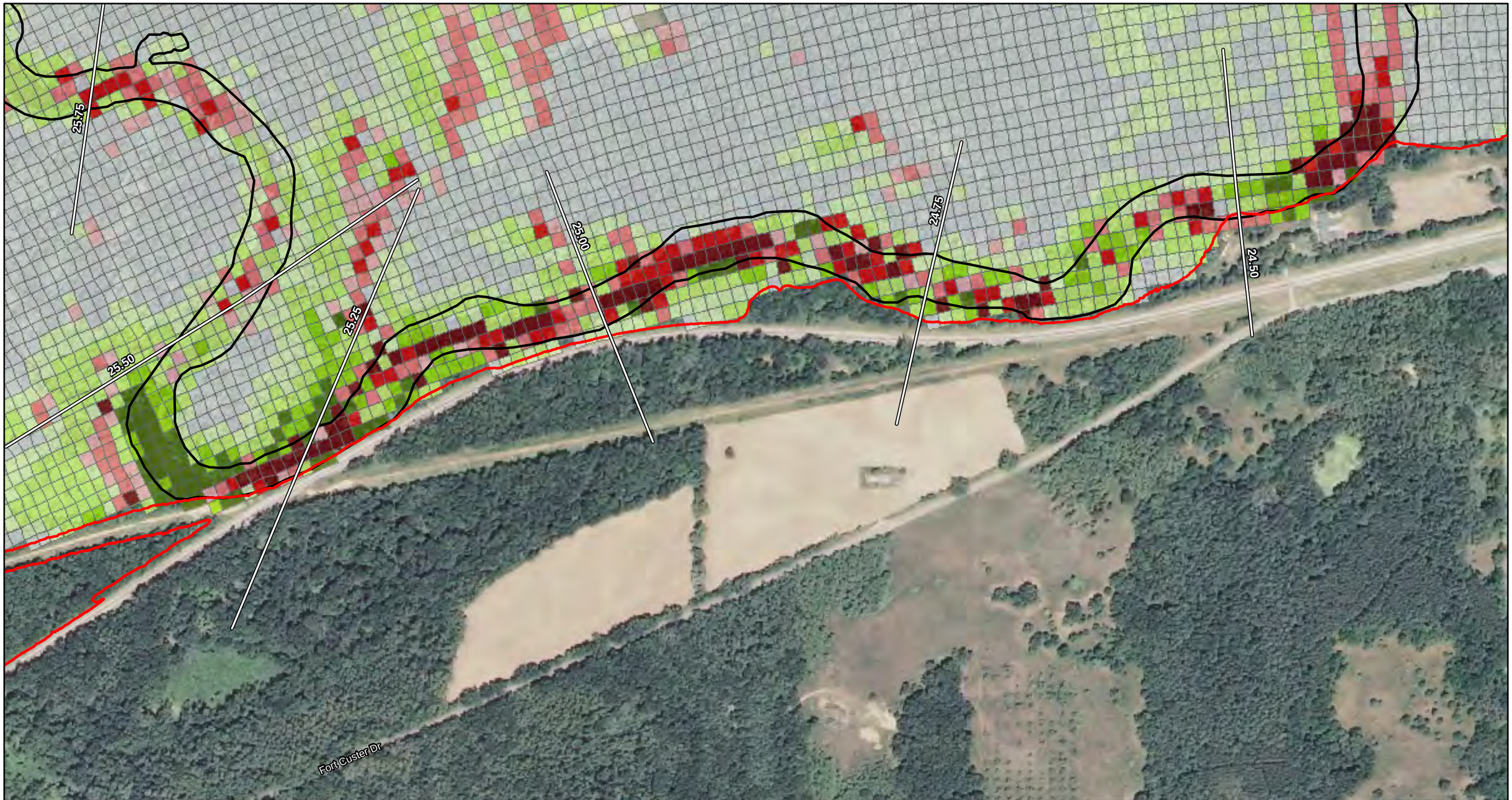
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 24.01 - MP 24.33

SHEET 25 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Map Location



Legend

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- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

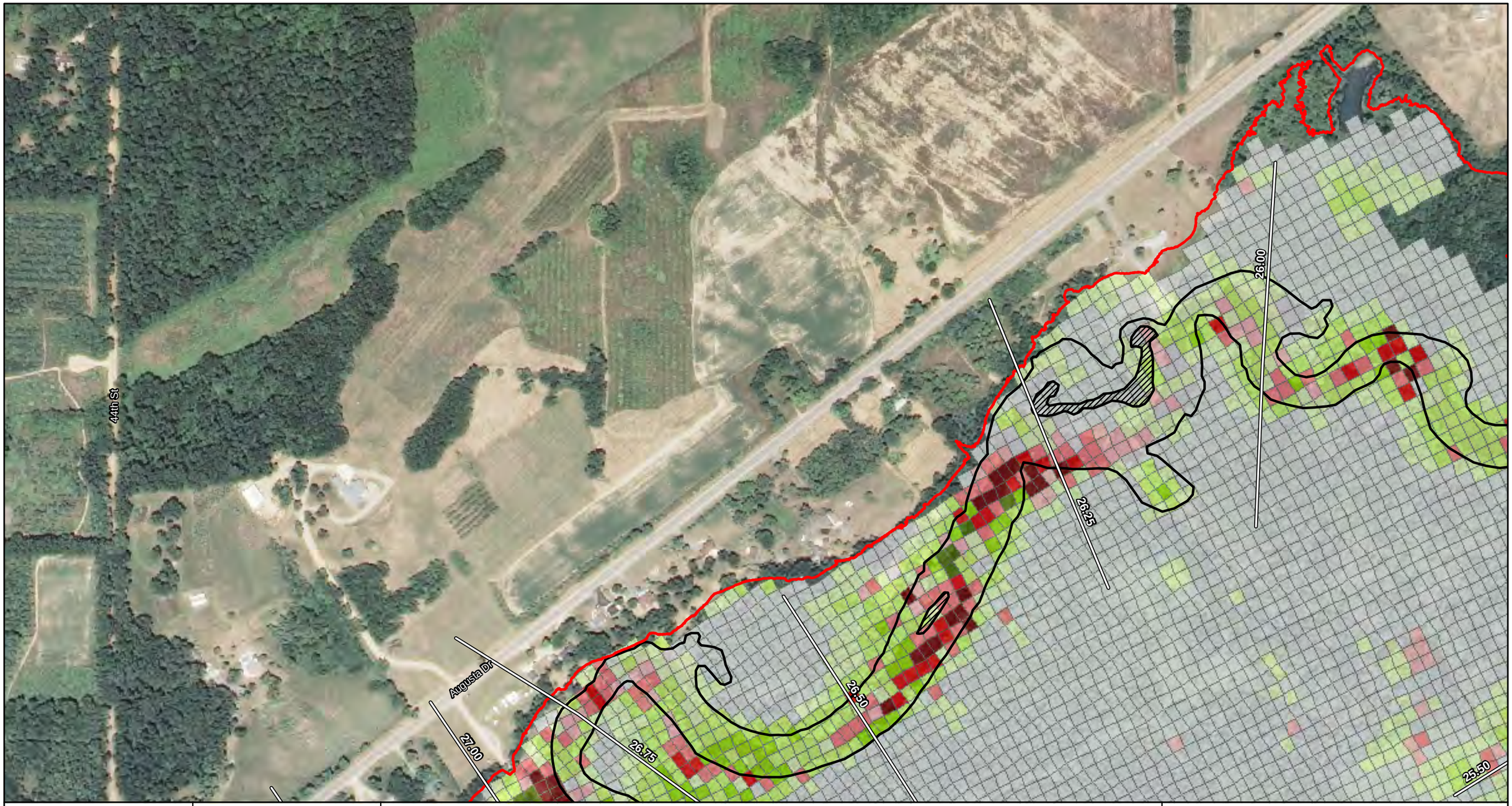
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 24.33 - MP 25.79

SHEET 26 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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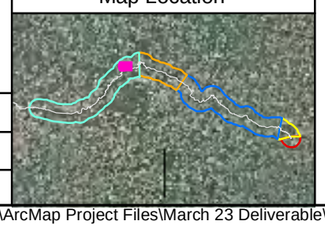
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

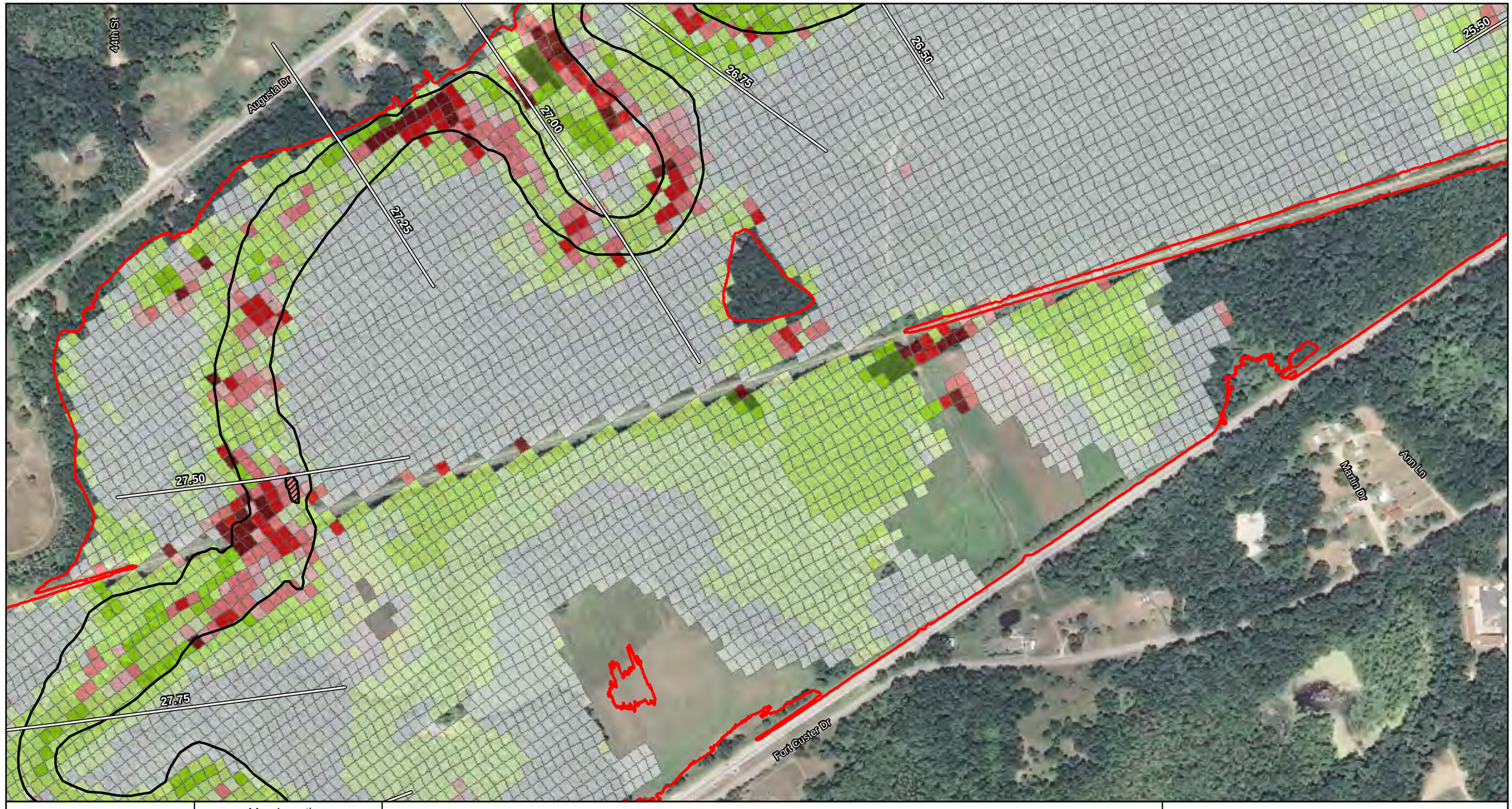
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 25.79 - MP 26.80

SHEET 27 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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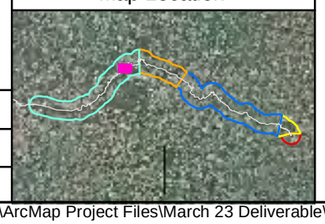
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 26.80 - MP 27.80

SHEET 28 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn: BRS 4/2/2012

Approved: DBR 4/2/2012

Project #: 106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 27.80NW - MP 28.22NW

SHEET 29 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



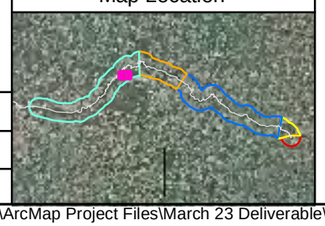
ENBRIDGE

Drawn: BRS 4/2/2012

Approved: DBR 4/2/2012

Project #: 106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

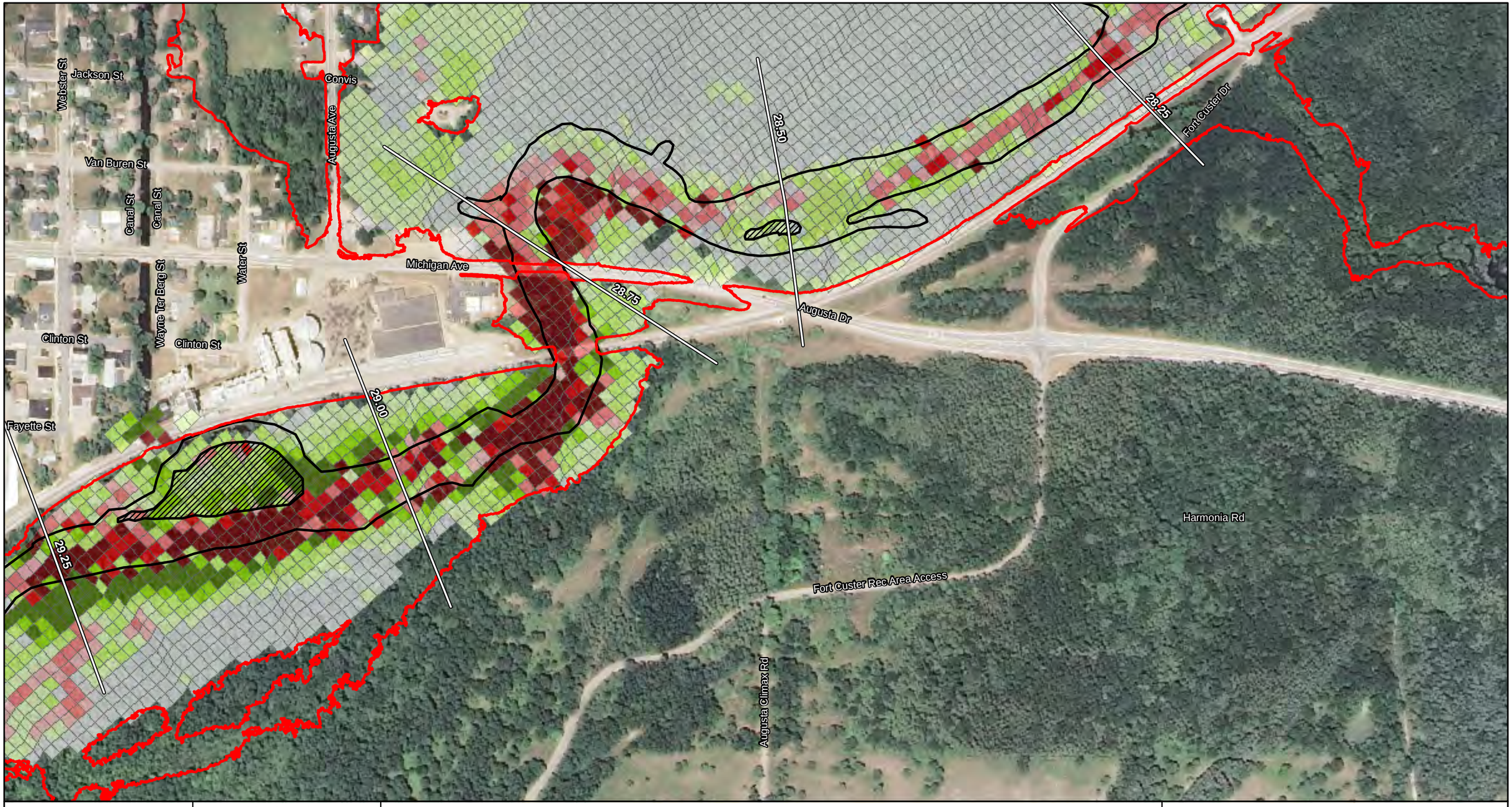
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 27.80SE - MP 28.22SE

SHEET 30 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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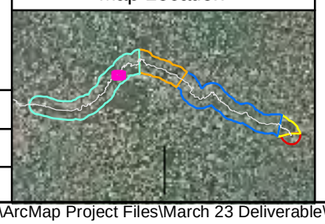
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

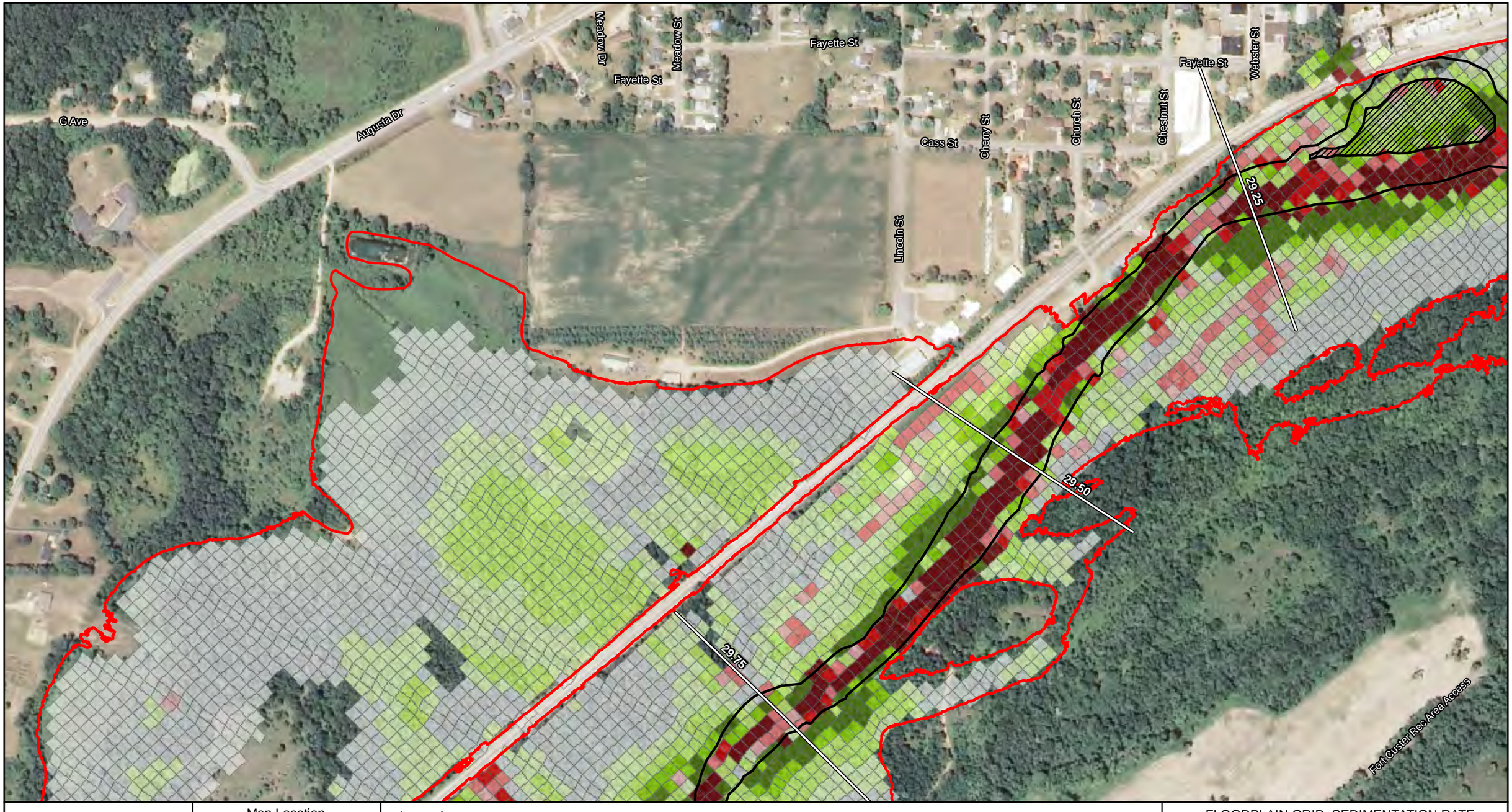
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 28.22 - MP 29.20

SHEET 31 OF 45

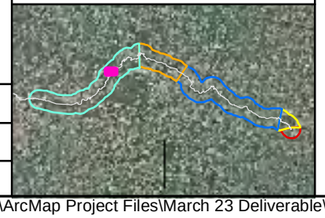
ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



Map Location



ENBRIDGE

Drawn: BRS 4/2/2012

Approved: DBR 4/2/2012

Project #: 106-4186

Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 29.20 - MP 29.82

SHEET 32 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

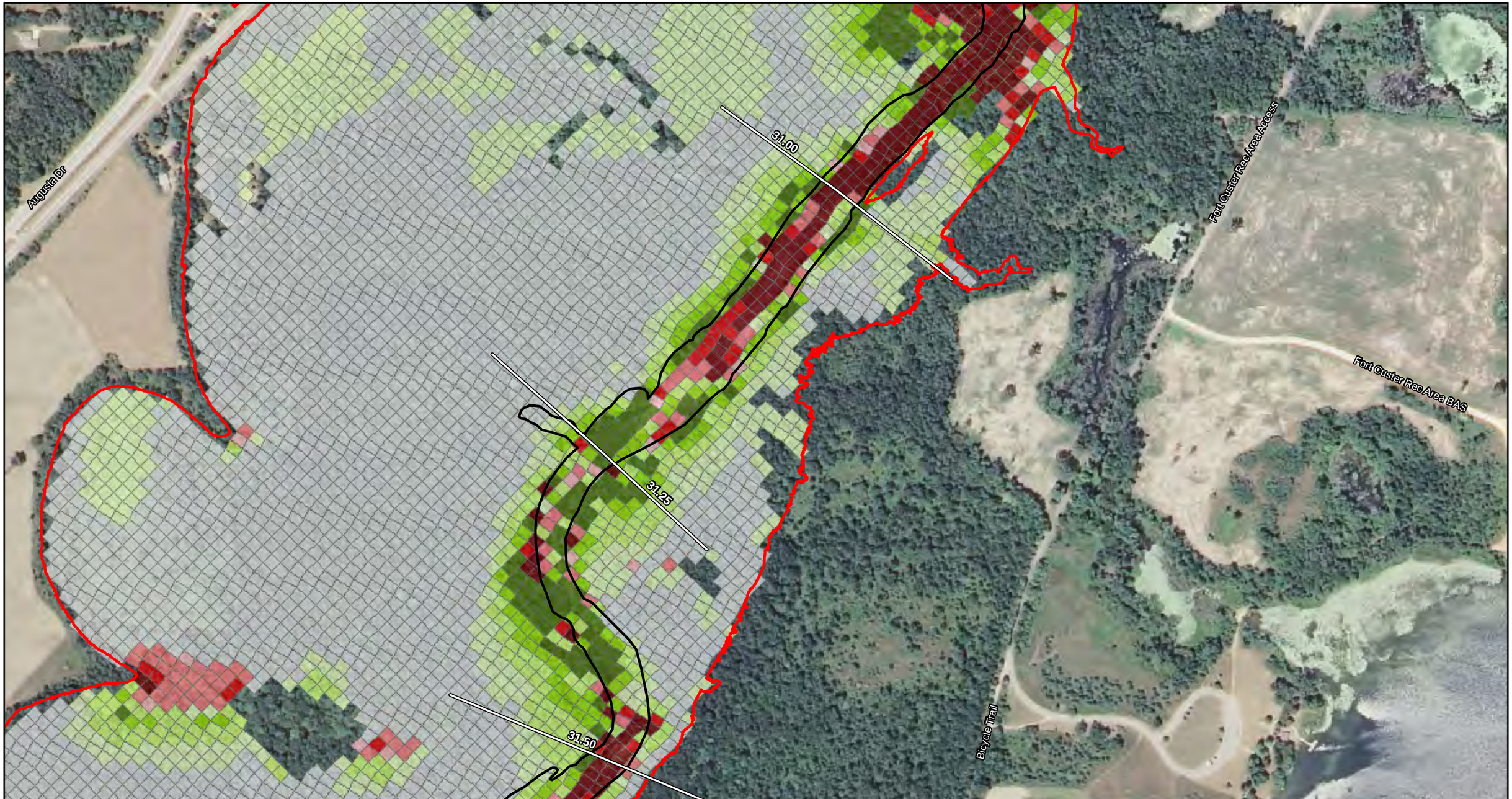
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 29.82 - MP 30.84

SHEET 33 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 30.84 - MP 31.40

SHEET 34 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
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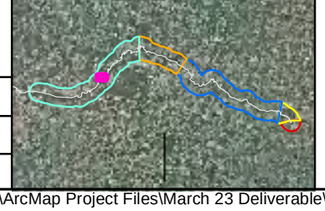
ENBRIDGE

Drawn: BRS 4/2/2012

Approved: DBR 4/2/2012

Project #: 106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

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- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

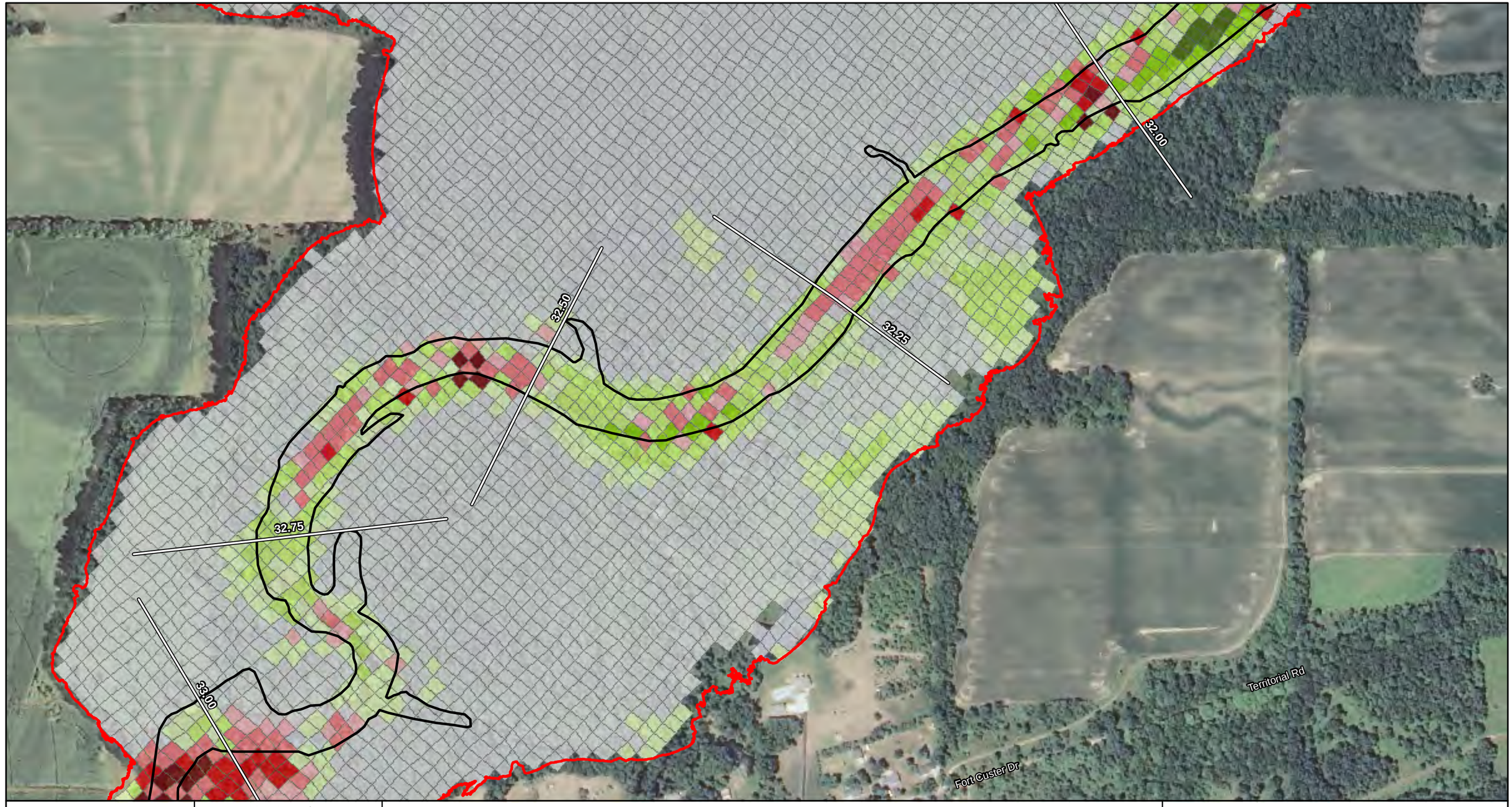
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 31.40 - MP 31.94

SHEET 35 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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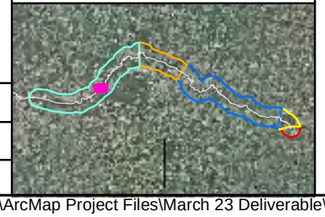
Aerial Photography Date: July & August 2009



ENBRIDGE

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Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

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All Grid Cells

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- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 31.94 - MP 33.00

SHEET 36 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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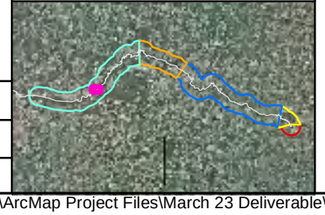
Aerial Photography Date: July & August 2009



ENBRIDGE

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Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 33.00 - MP 33.52

SHEET 37 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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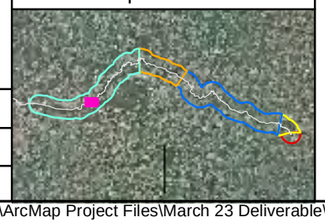
Aerial Photography Date: July & August 2009



ENBRIDGE

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Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

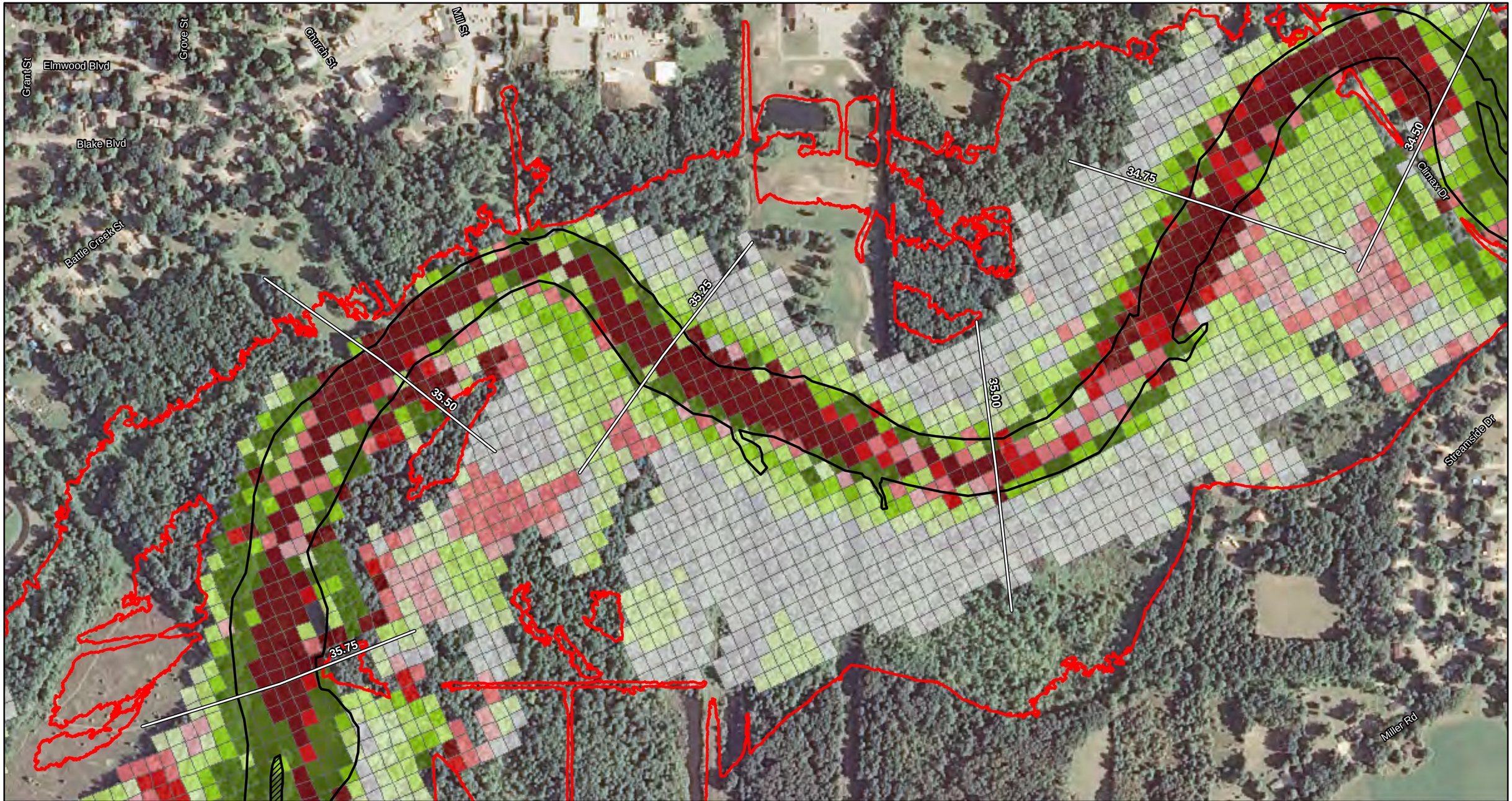
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 33.52 - MP 34.70

SHEET 38 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009



Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

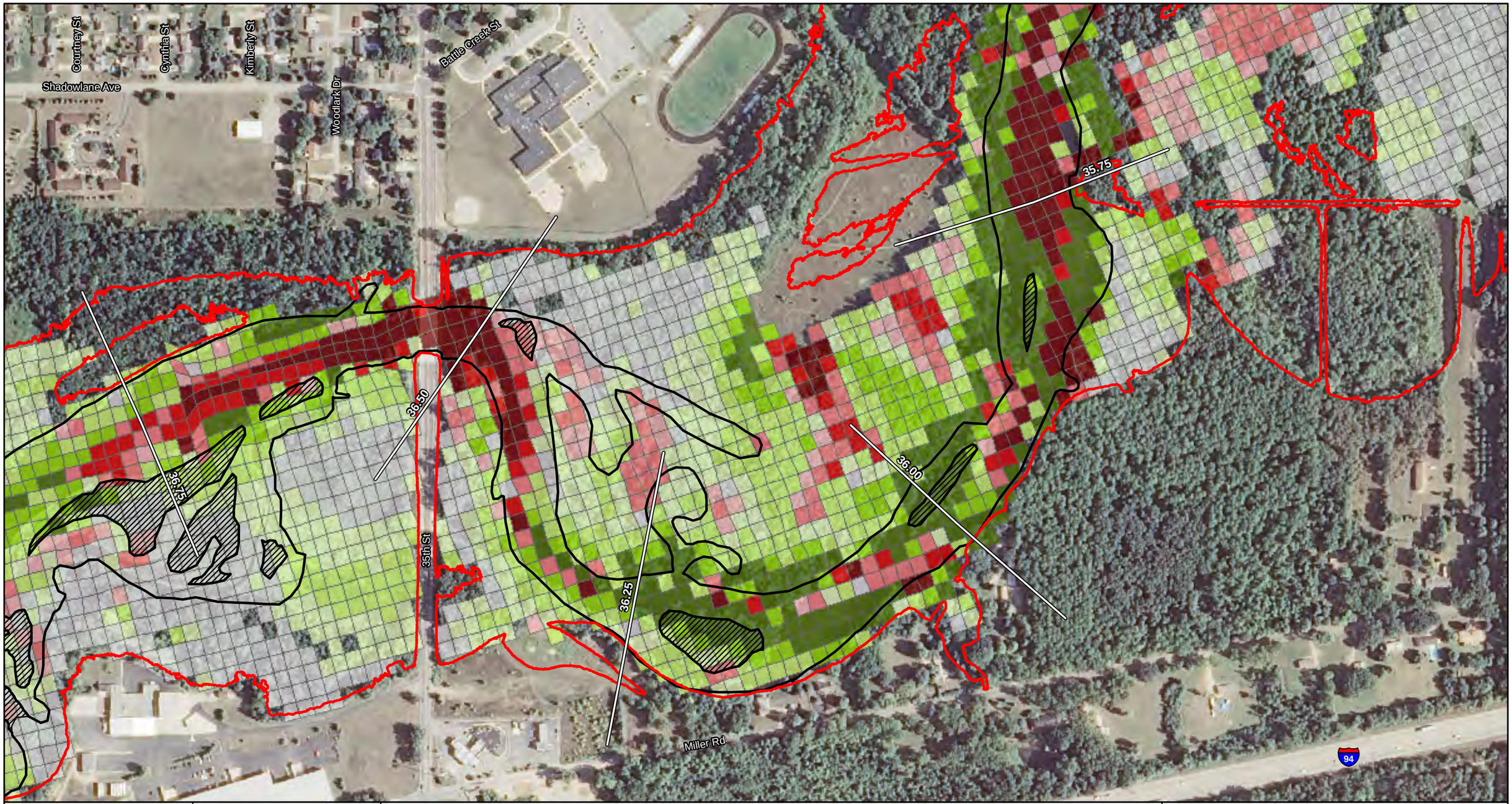
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 34.70 - MP 35.75

SHEET 39 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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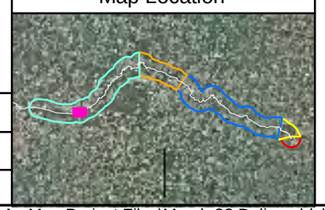
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

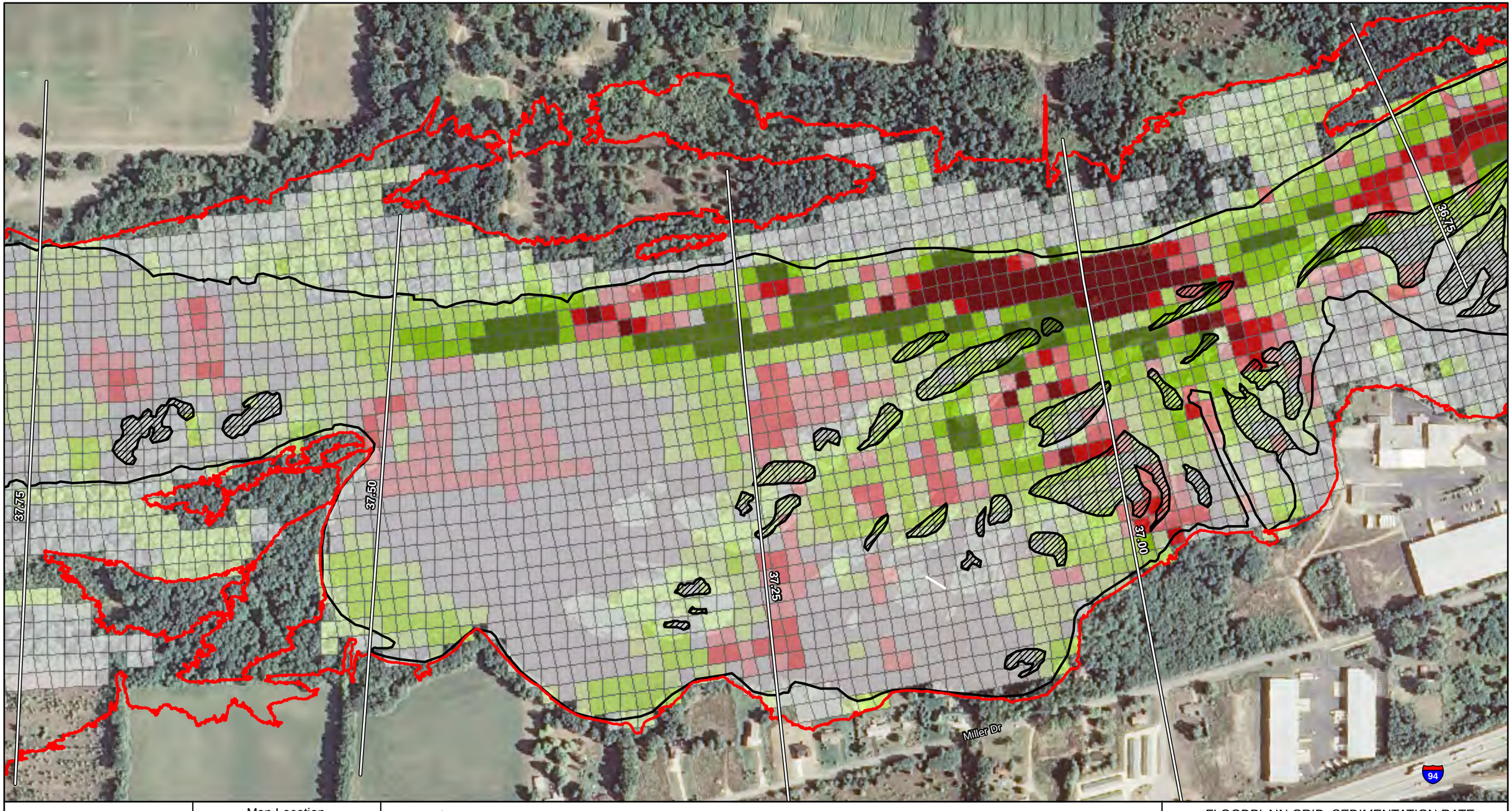
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 35.75 - MP 36.75

SHEET 40 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
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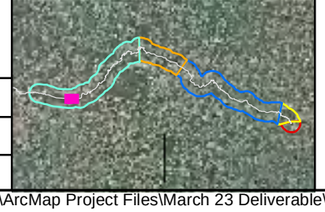
Aerial Photography Date: July & August 2009



ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

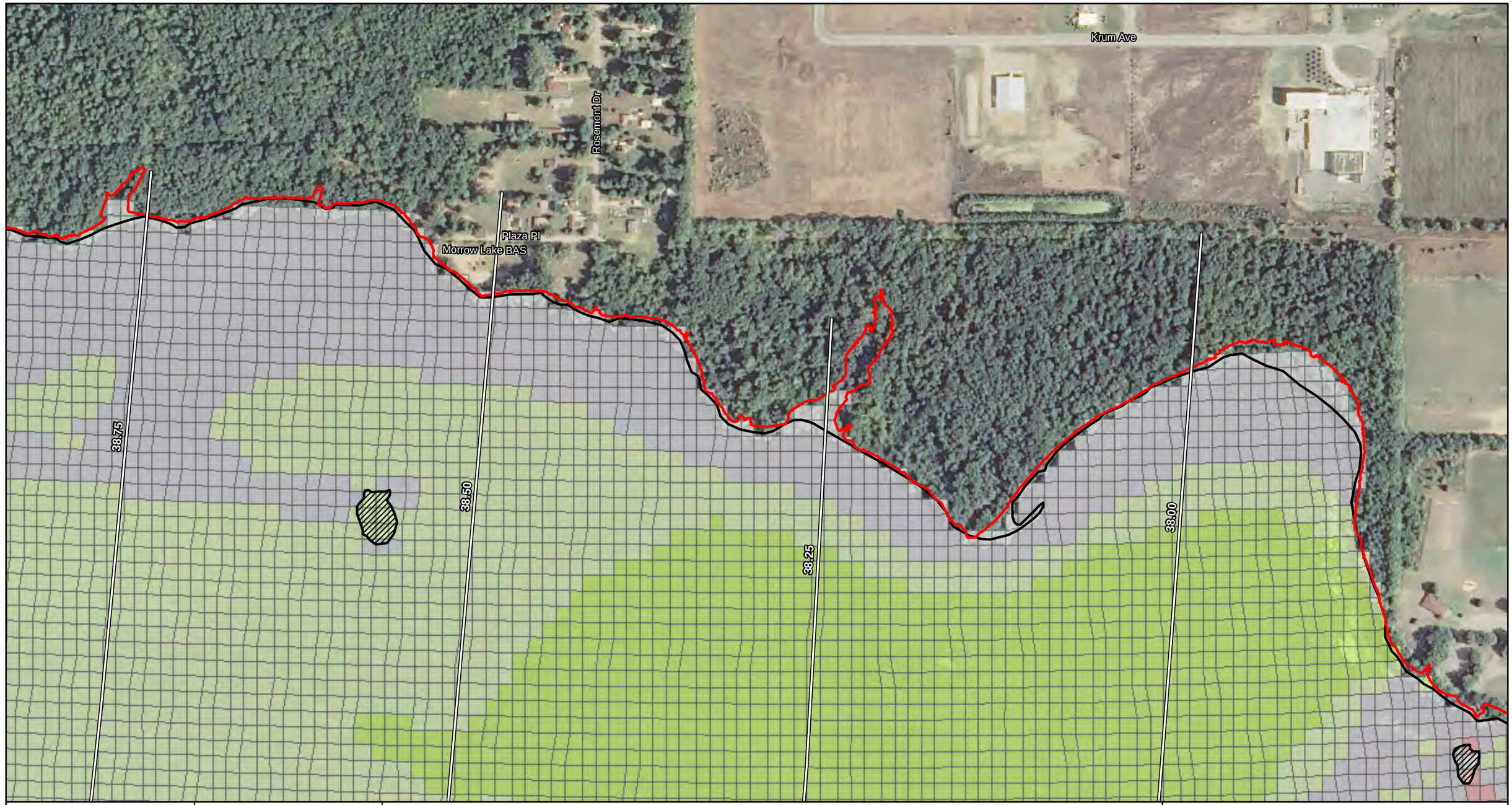
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 36.75 - MP 37.75

SHEET 41 OF 45

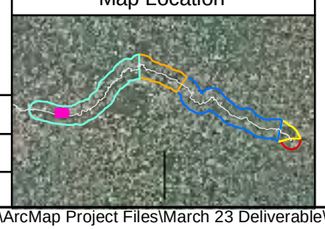
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Aerial Photography Date: July & August 2009



Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

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Drawn:	BRS 4/2/2012
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Project #:	106-4186

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 37.75N - MP 38.80N

SHEET 42 OF 45

ENBRIDGE LINE 6B MP 608
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Aerial Photography Date: July & August 2009

38.75
38.50
38.25
38.00
37.75
94
Lyth Rd
Miller Dr

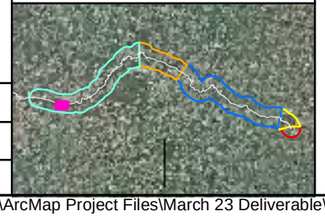
ENBRIDGE

Drawn: BRS 4/2/2012

Approved: DBR 4/2/2012

Project #: 106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

- Channel Bankline
- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 37.75S - MP 38.80S

SHEET 43 OF 45

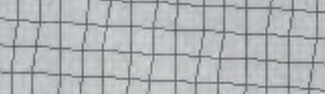
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ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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Aerial Photography Date: July & August 2009

Arden Ave
Morrow St
Elliot Rd
Lawndale Ave
Chene Dr
Consumers Power Dr
39.75
39.50
39.25
39.00

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

- >10.00 mm/week erosion
- 5.00 - 10.00 mm/week erosion
- 1.00 - 5.00 mm/week erosion
- 0.10 - 1.00 mm/week erosion
- No Change
- 0.10 - 1.00 mm/week deposition
- 1.00 - 5.00 mm/week deposition
- 5.00 - 10.00 mm/week deposition
- >10.00 mm/week deposition

mm/week = Millimeters Per Week

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- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

ENBRIDGE

Drawn:	BRS 4/2/2012
Approved:	DBR 4/2/2012
Project #:	106-4186

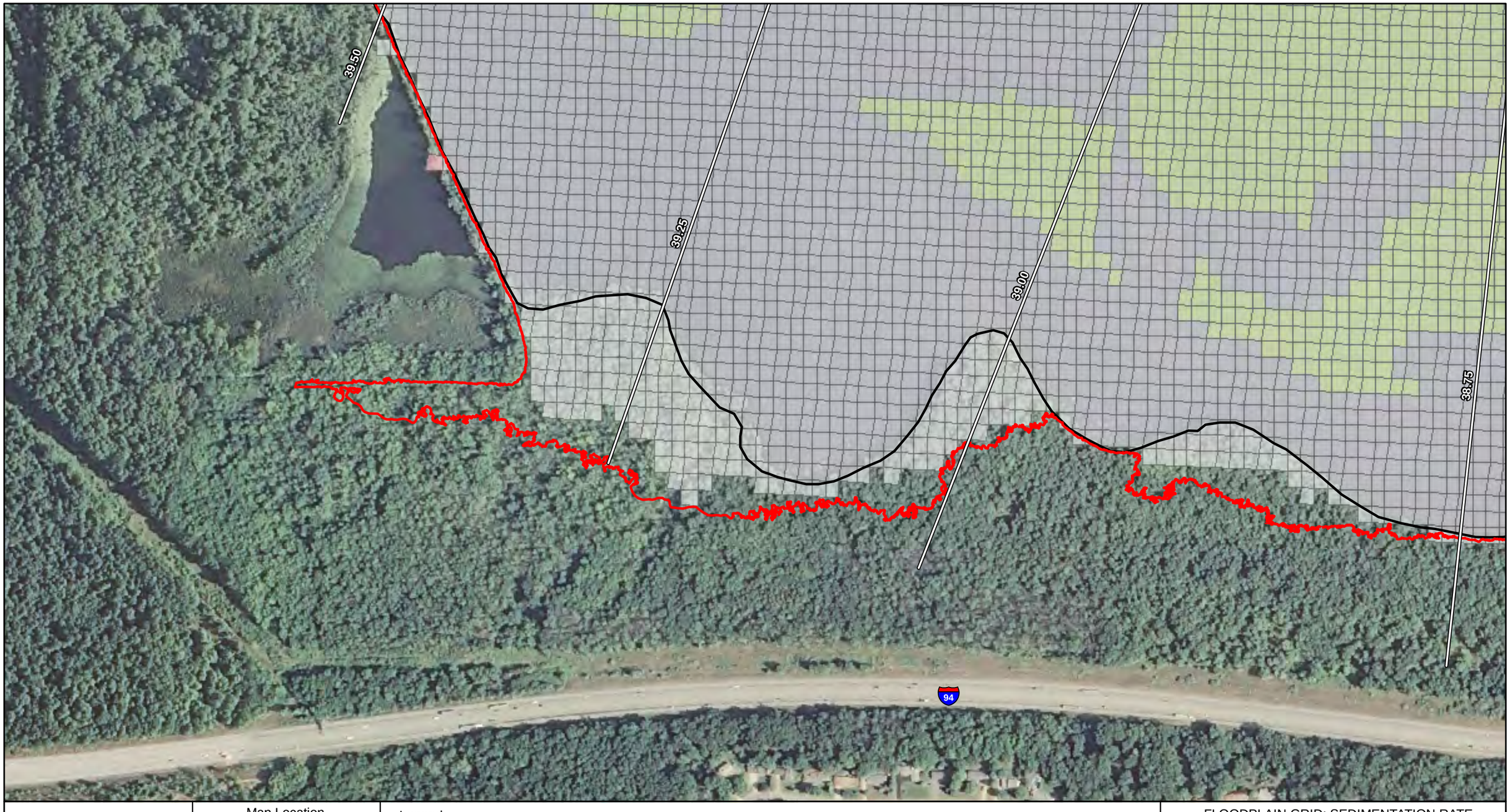
FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 38.80N - MP 39.95N

SHEET 44 OF 45

ENBRIDGE LINE 6B MP 608
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Aerial Photography Date: July & August 2009



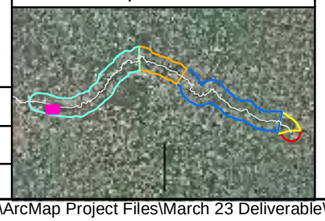
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Drawn: BRS 4/2/2012

Approved: DBR 4/2/2012

Project #: 106-4186

Map Location



Legend

Sedimentation Rate (mm/week)

All Grid Cells

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- 0.10 - 1.00 mm/week erosion
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mm/week = Millimeters Per Week

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- Island Bankline
- HEC-RAS 100-Year Floodplain
- Quarter Mile Grid Segment

N

0 175 350 700

Scale in Feet

FLOODPLAIN GRID: SEDIMENTATION RATE
ALL GRID CELLS
100-YEAR FLOOD
MP 38.80S - MP 39.95S

SHEET 45 OF 45

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
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Aerial Photography Date: July & August 2009