St. Lawrence Seaway Management Corporation

Niagara Region

APPENDIX A
REACH 7
BANK EROSION
AREAS

EROSION REACH 7 **Date** 2014-08-07 **By** M. Bowden, C. Wild

Photo. xxx = Photo 2014-101-xxx

N end W/P	Centre W/P	S end W/P	Approx Length (m)	Photos	Comments
Bridge 11		Port Robinson	250		West Bank - Multiple small areas in Condition 1. Cumulative length = 250m
	27		10	574	
	28		5	575	
	29		7	576, 7	Stairs at Bridge 11 East Abutment north side
30		31	137	578	

EROSION LONG REACH **Date** 2014-08-08 **By** M. Bowden, C. Wild

Photo. xxx = Photo 2014-101-xxx

N end W/P	Centre W/P	S end W/P	Approx Length (m)	Photos	Comments
38		39	37	590	
41		40	60	591	
42		43	72	592	@ Welland R. Syphon Bin Wall. Start 5 m north of W/P 42
	44		10	593	
45		46	110	594, 5	
	47		4		
	48		12		
	49		6		
50		51	47		
	52		10	597	
53		55	480	598, 9, 600, 1	Endangering Nil for now, could eventually affect Service Road and Poles
	56		10	602	
	57		45		
	58		10	603	
59		60	142	604, 5, 6	
61		64	475	607, 8	Ignore W/P 62 and 63
65		67	90	609	East Main St. Tunnel. Ignore W/P 66
	68		25	610	
	69		5		
	70		10	611	
	71		5		
72		73	265	612, 3, 4	
	74		20	615, 6	
	75		20	617	

EROSION LONG REACH **Date** 2014-11-04 **By** M. Bowden, C. Wild

Photo. xxx = Photo 2014-101-xxx

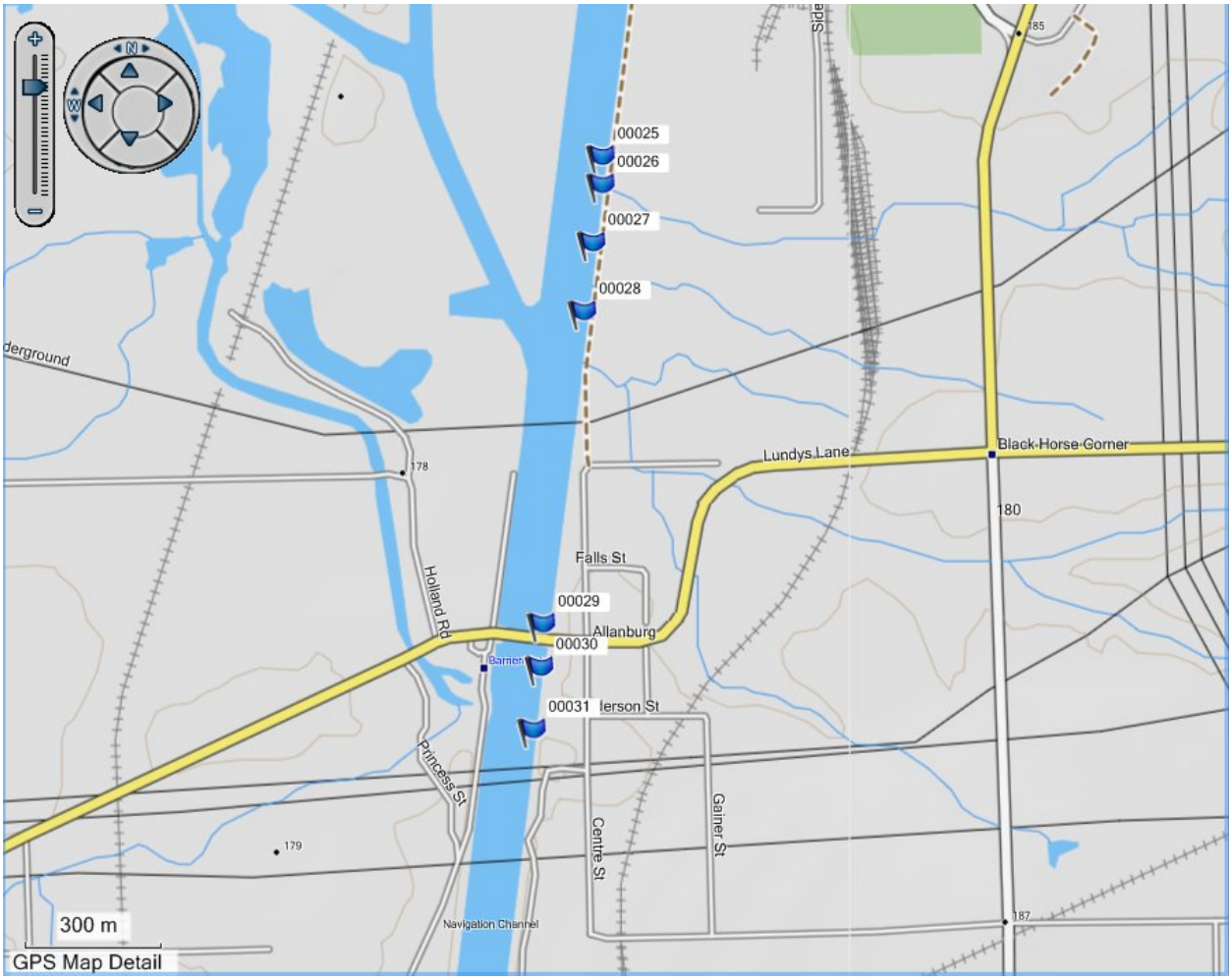
N end W/P	Centre W/P	S end W/P	Approx Length (m)	Photos	Comments
77		78	235		Starting at Bridge 10 Abutment
		79	15	900	
		80	15		
	81		15	902, 3	
	85		10	905	

EROSION LONG REACH **Date** 2014-11-12 **By** M. Bowden, C. Wild

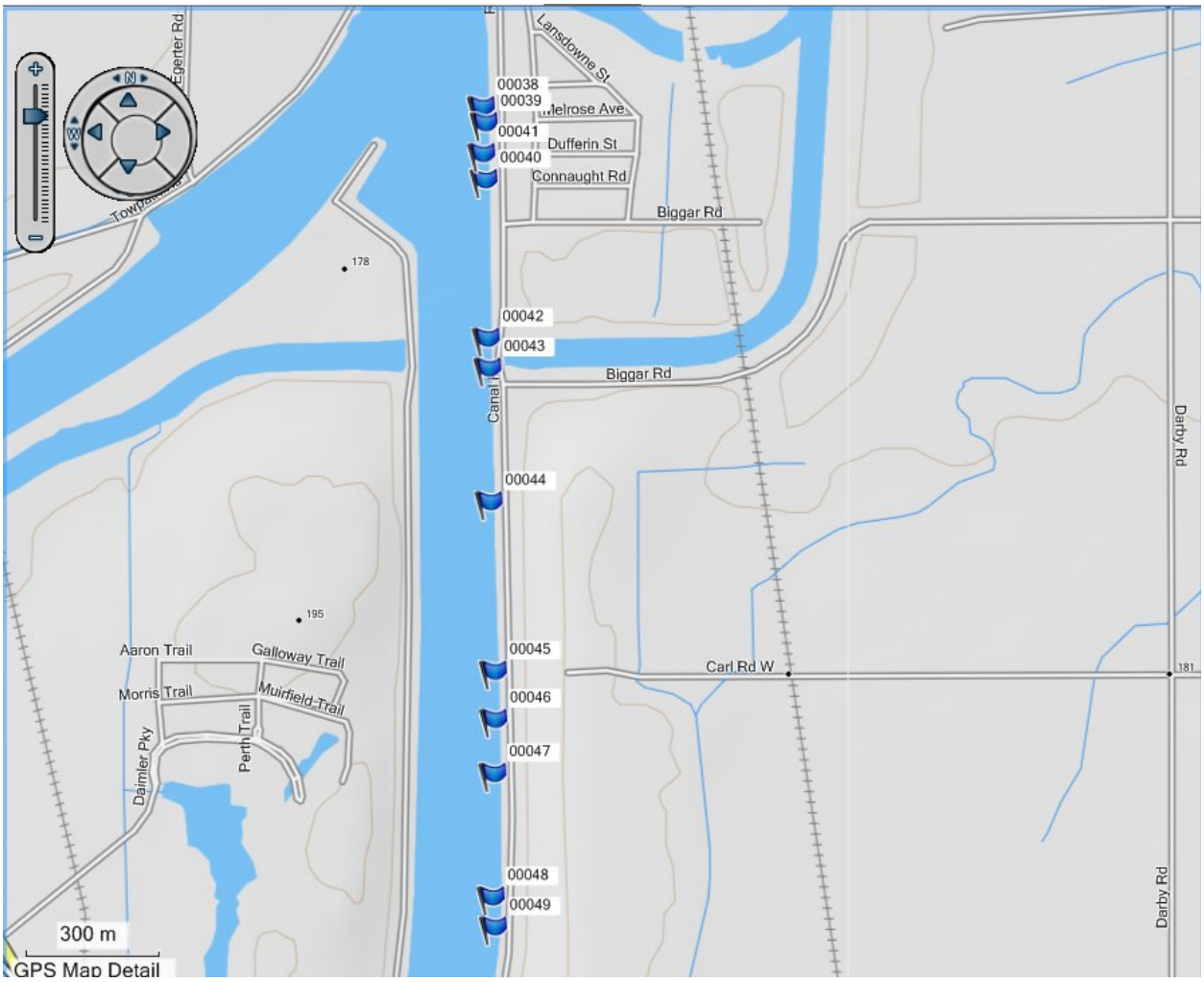
Photo. xxx = Photo 2014-101-xxx

N end W/P	Centre W/P	S end W/P	Approx Length (m)	Photos	Comments
87		86	140	908	
88			20	909	
89			20		
90			20	910	Lyons Creek
92		91	80	911	
95		93	640		
	96		10	912	
98		97	213	913	
	99		20		
	100		30		
	101		60	914	Dock 10
102		103	75		Townline Tunnel next to dyke
	104		20		Townline Tunnel dyke
	105		10	915	
106		107	460	916	
	108		100	917, 8	Pole not in use
110		111	260	919, 20, 21	Unsure of responsibility for maintaining bank at third party dock facility
	112		30	922	
		113	10	923	
114		115	200	924, 5	
116		117	385	926, 7	Photos of worst area at south end
118		119	380		
120		121	1000	928, 9	
122		123	215		
123		124	66		Gas line crossing
125		126	44		Gas line crossing
127		129	330		
	130		30		
130		131	540		E. Main St. Tunnel
132		134	608		
135		136	484		

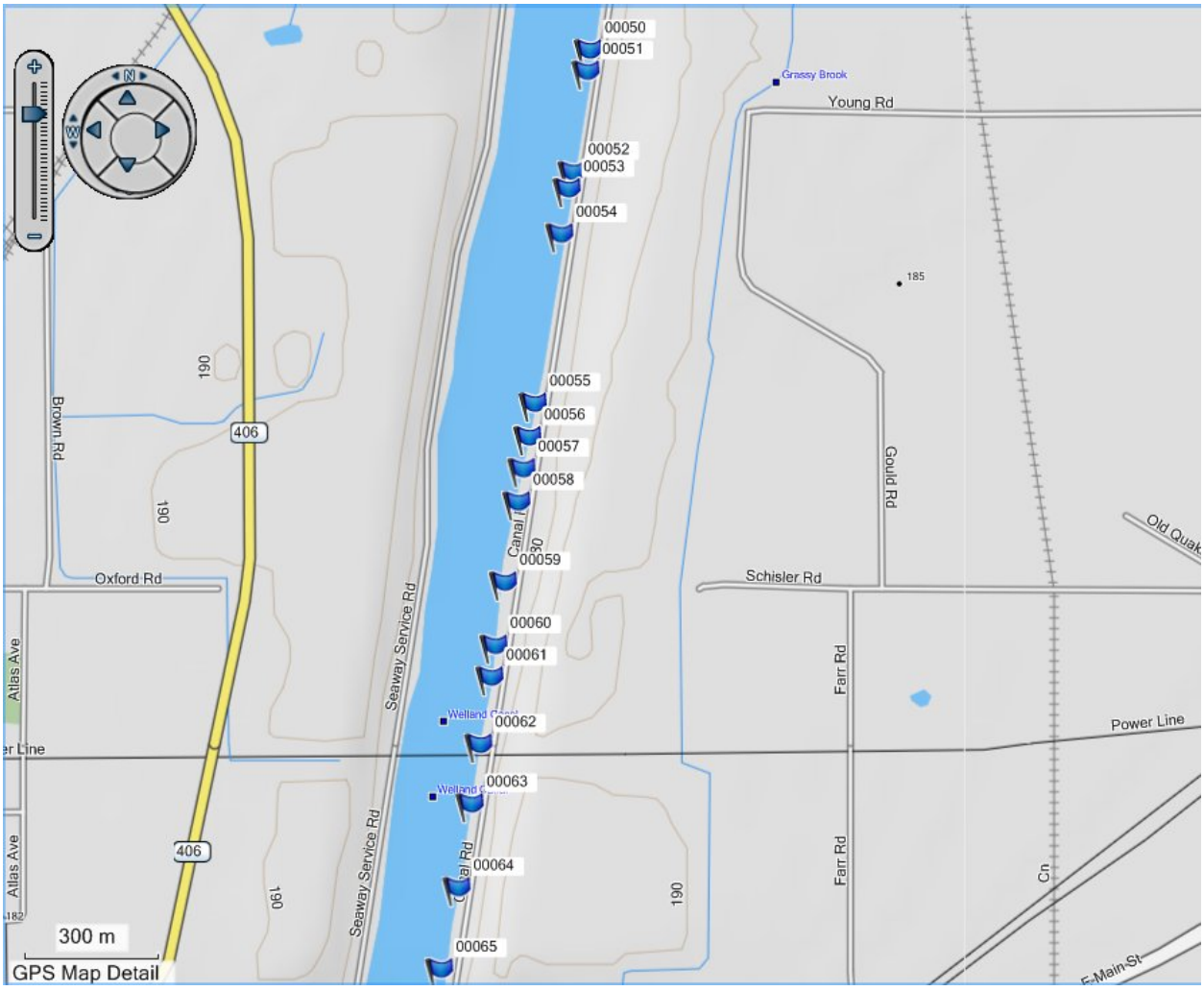
Way Points 25 to 31



Way Points 38 to 49



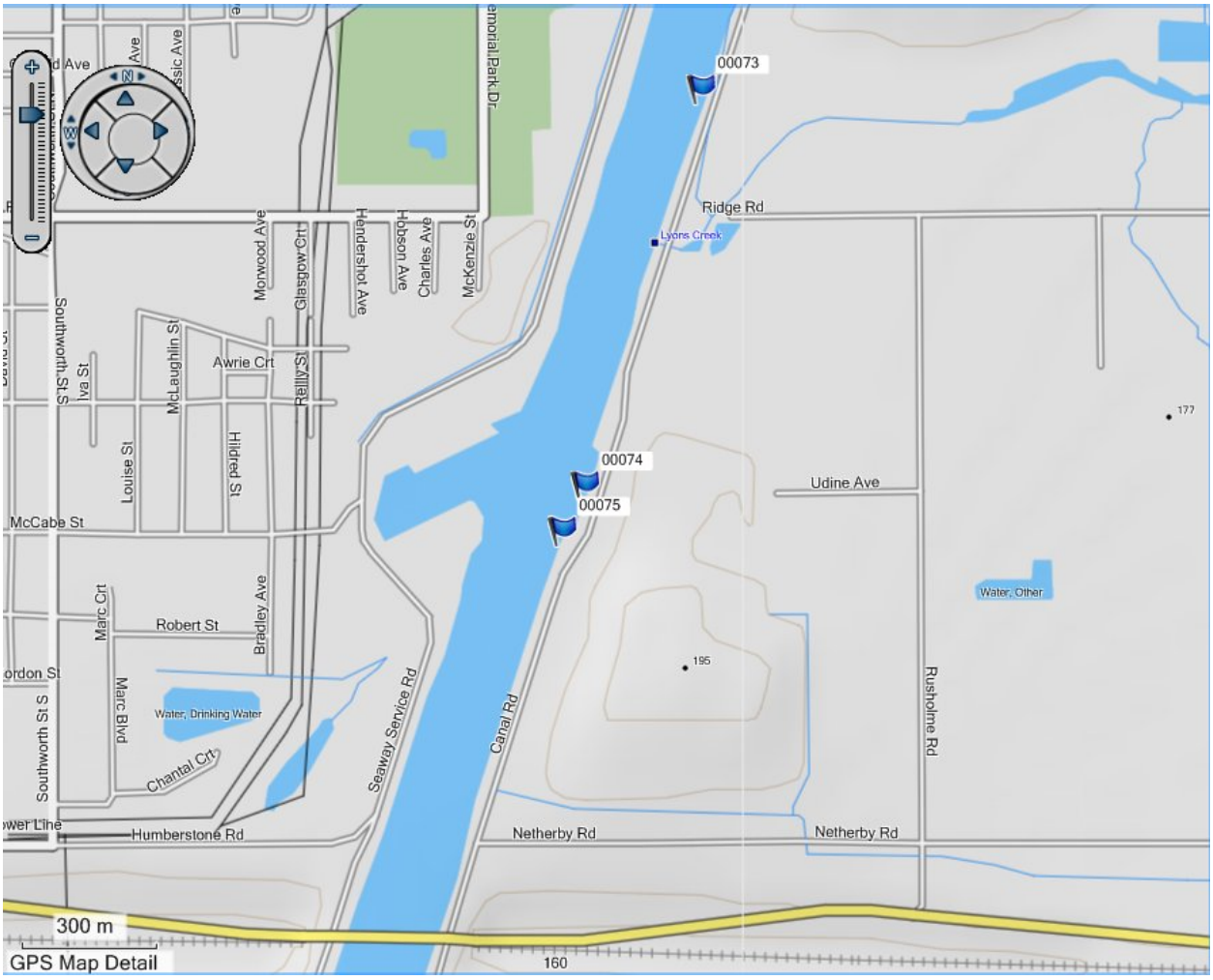
Way Points 50 to 65



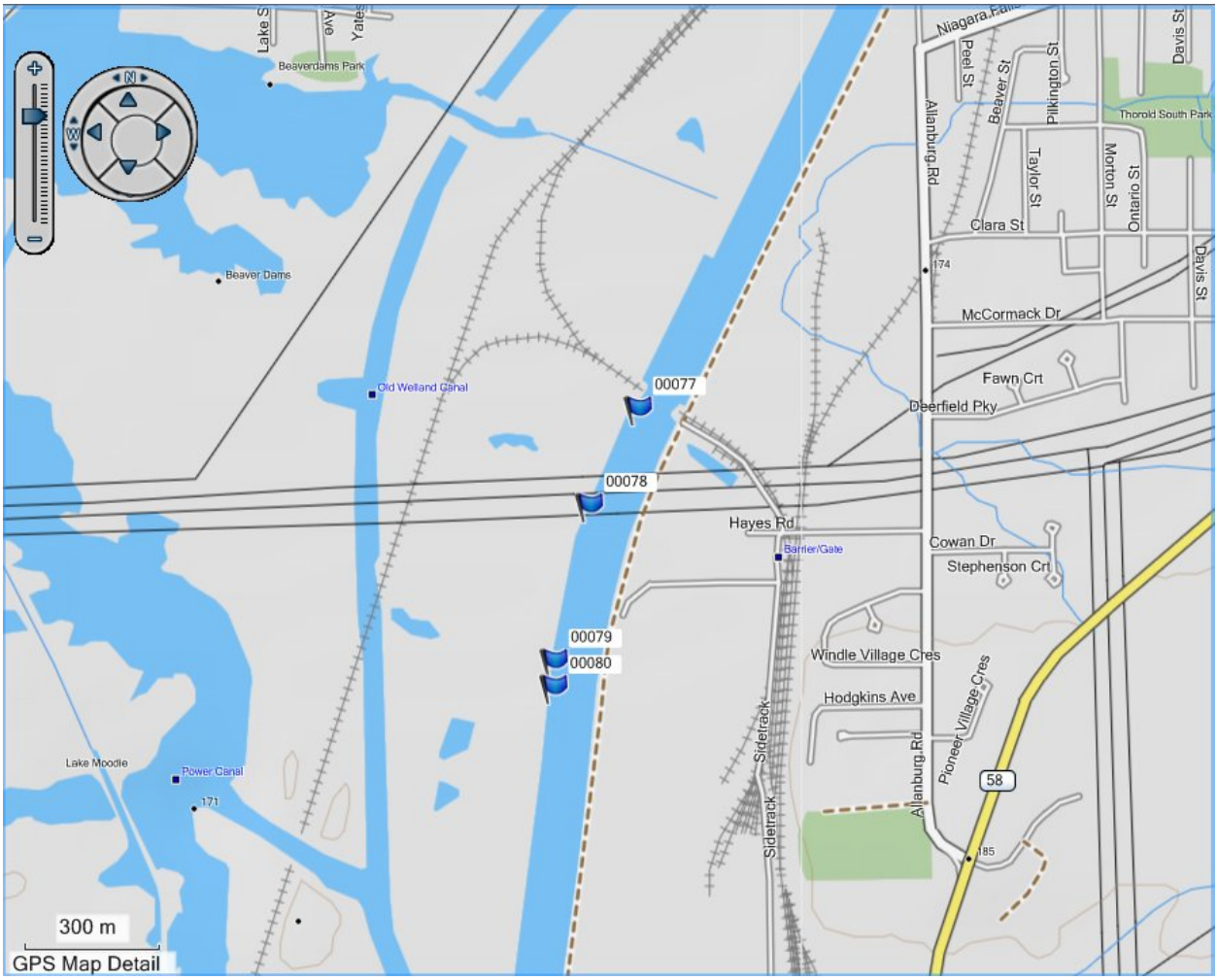
Way Points 65 to 73



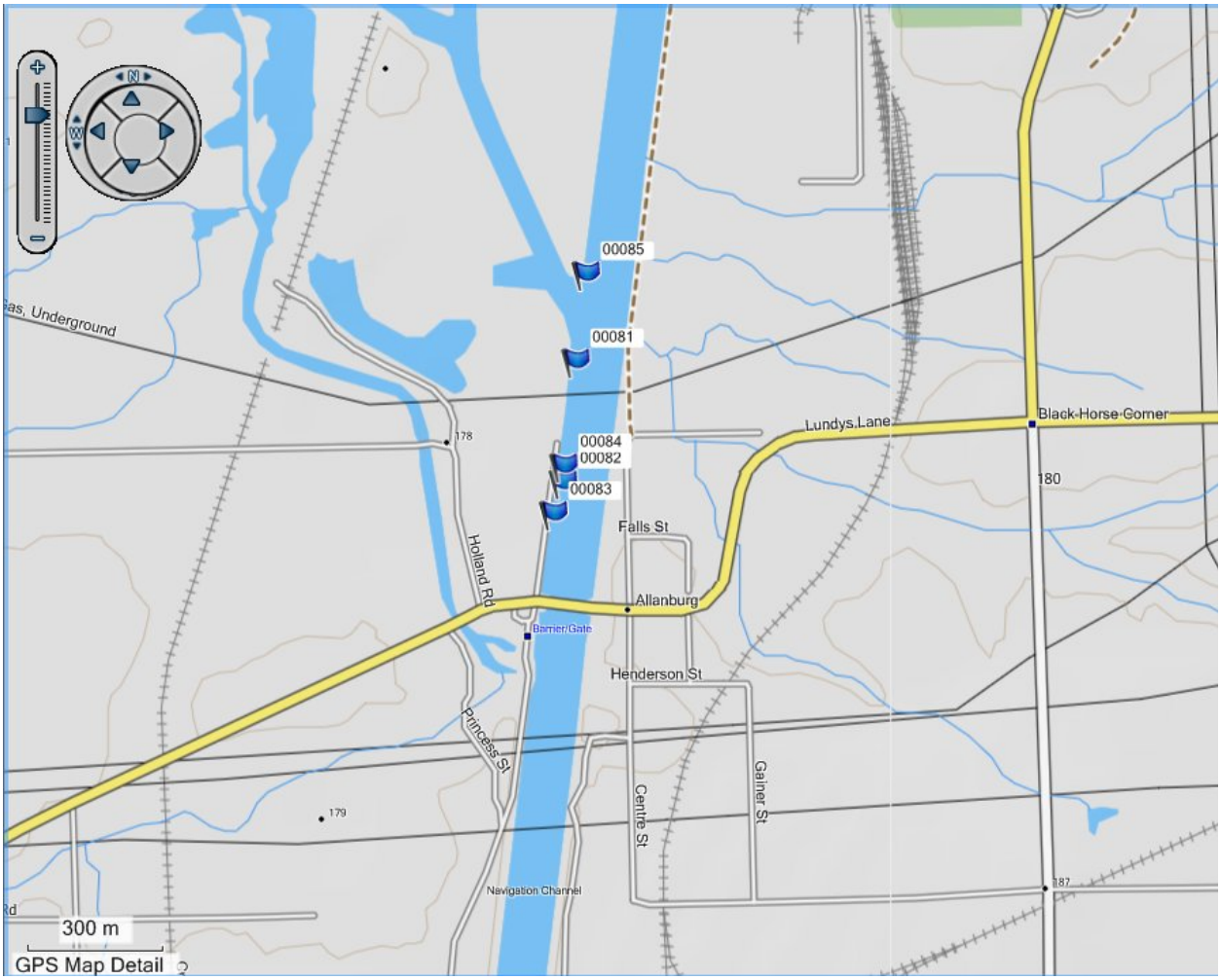
Way Points 73 to 75



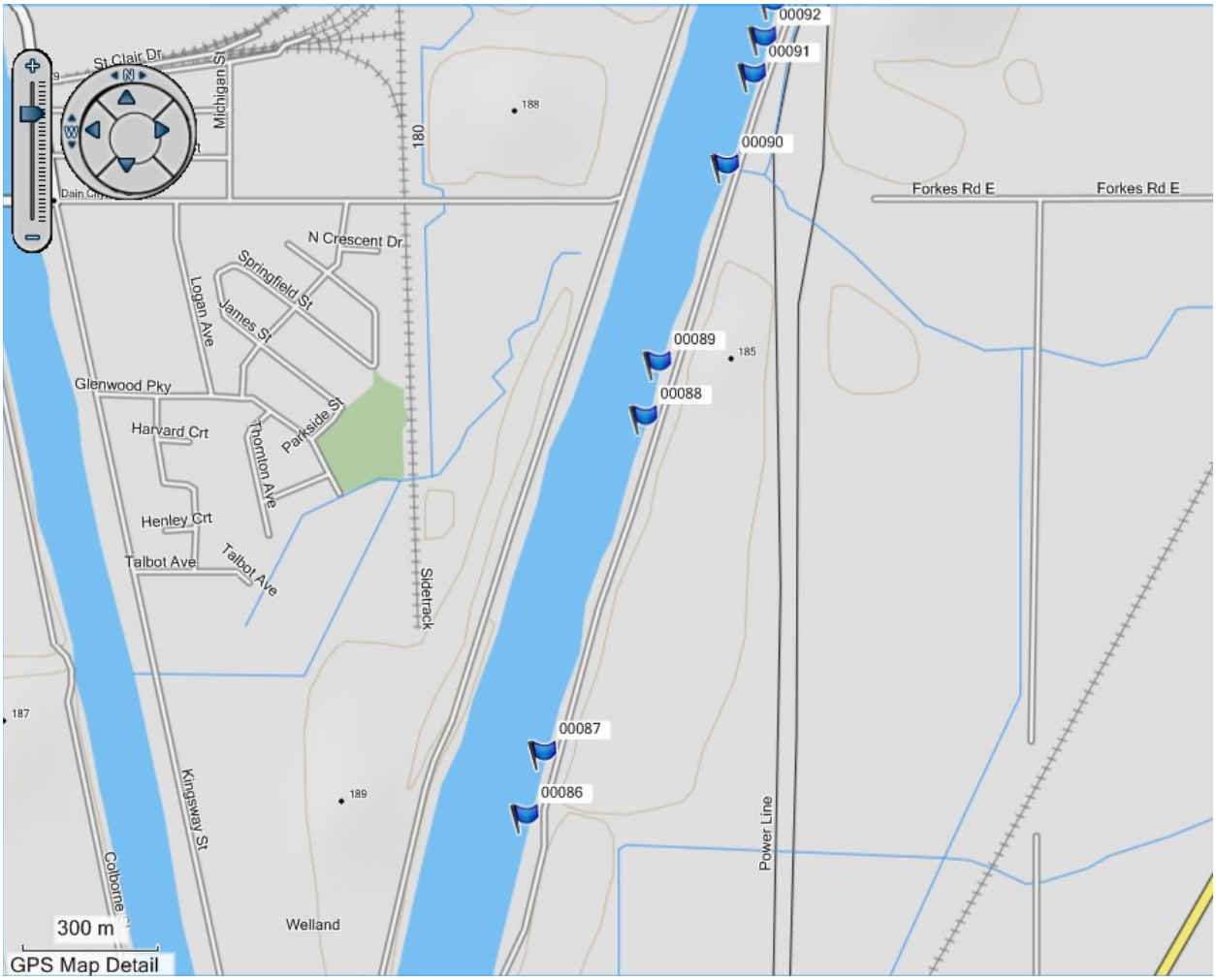
Way Points 77 to 80



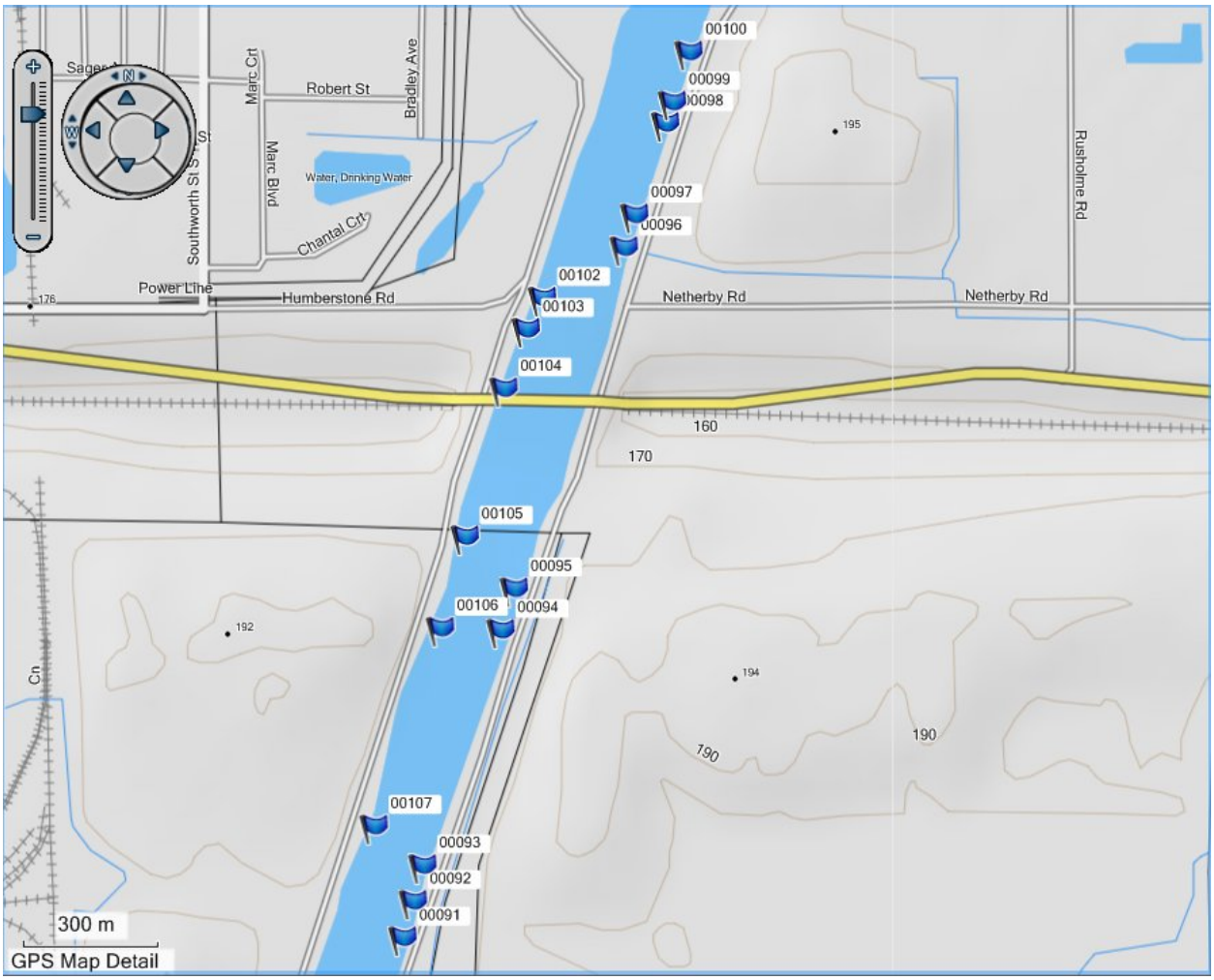
Way Points 81 to 85



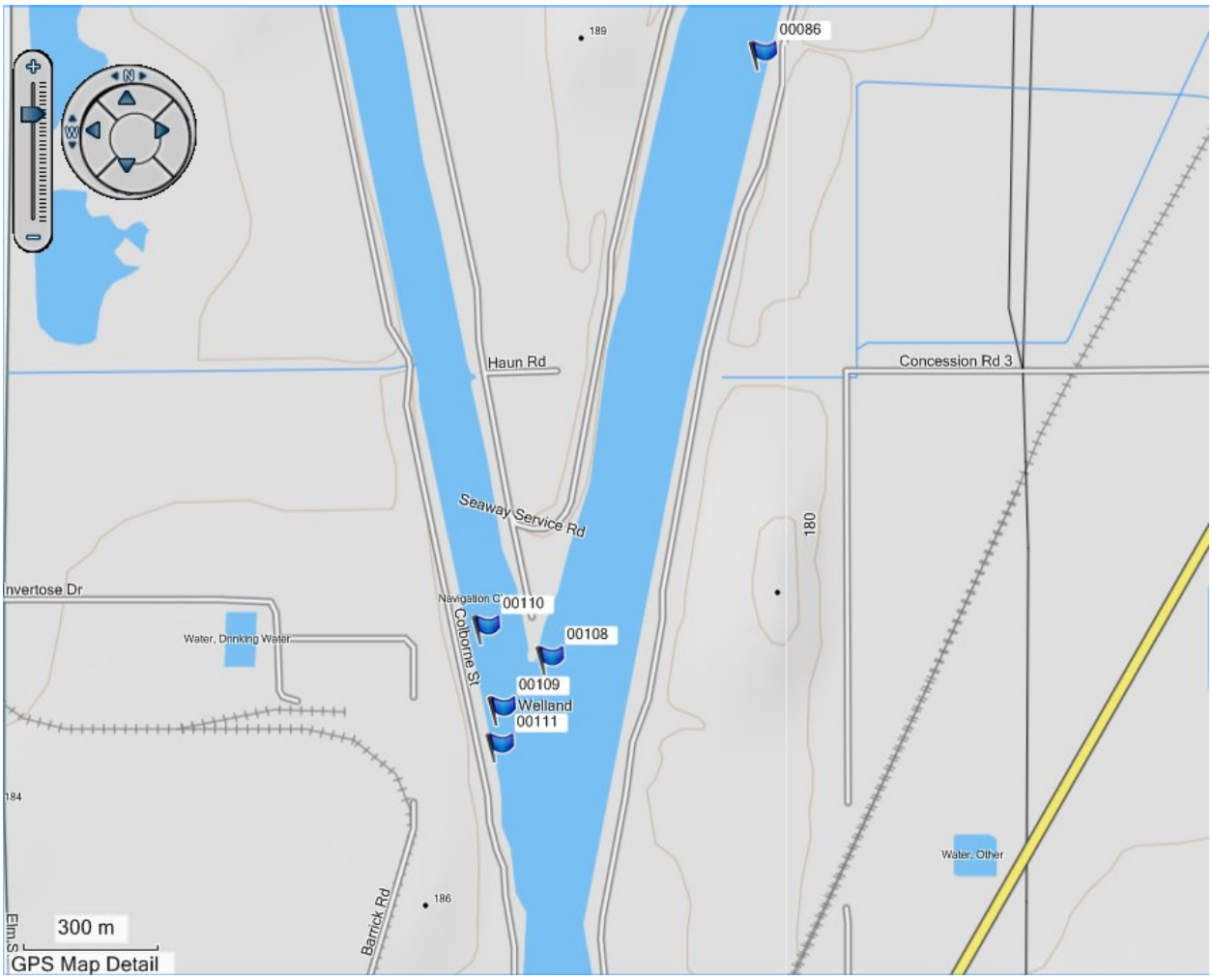
Way Points 86 to 92



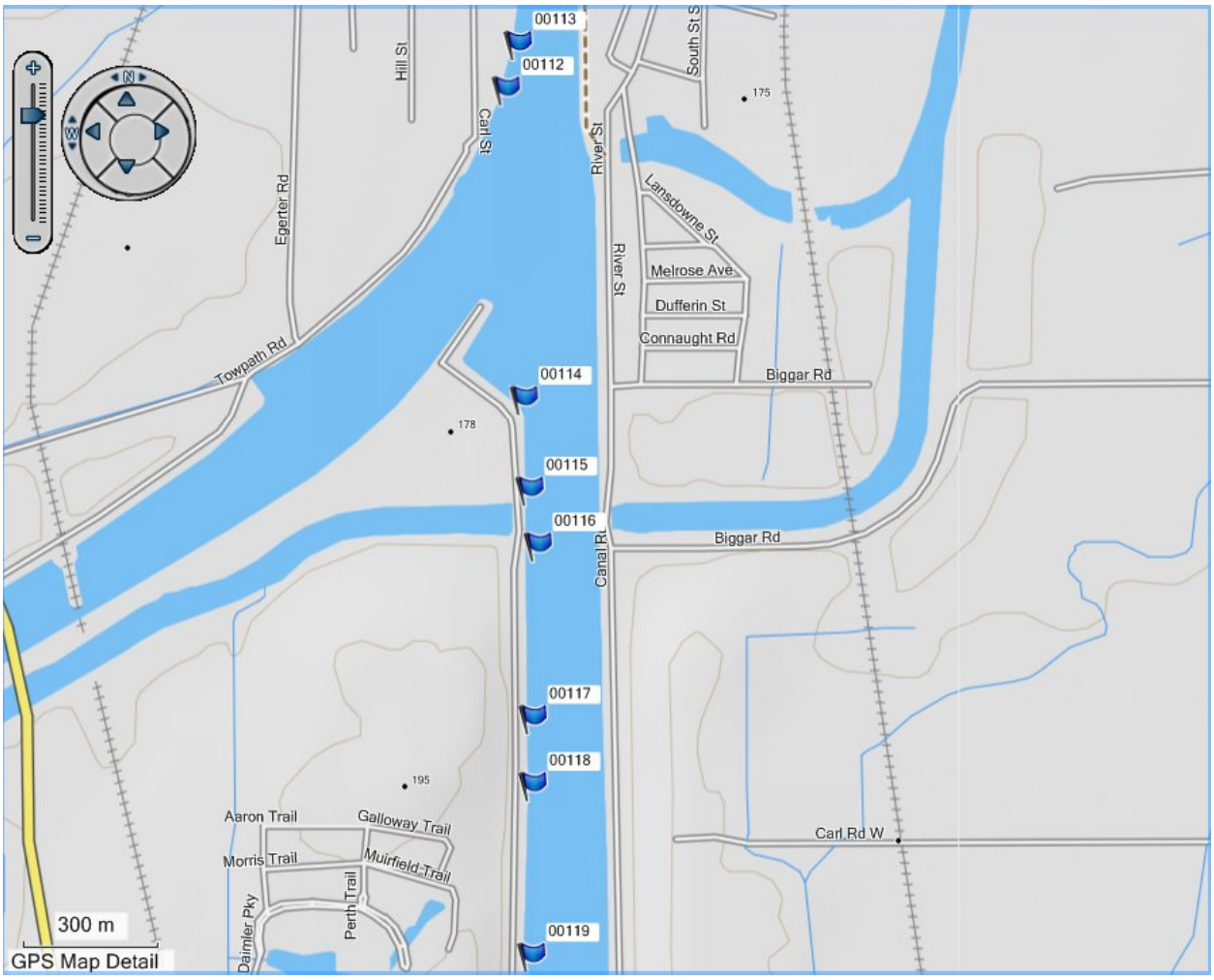
Way Points 91 to 107



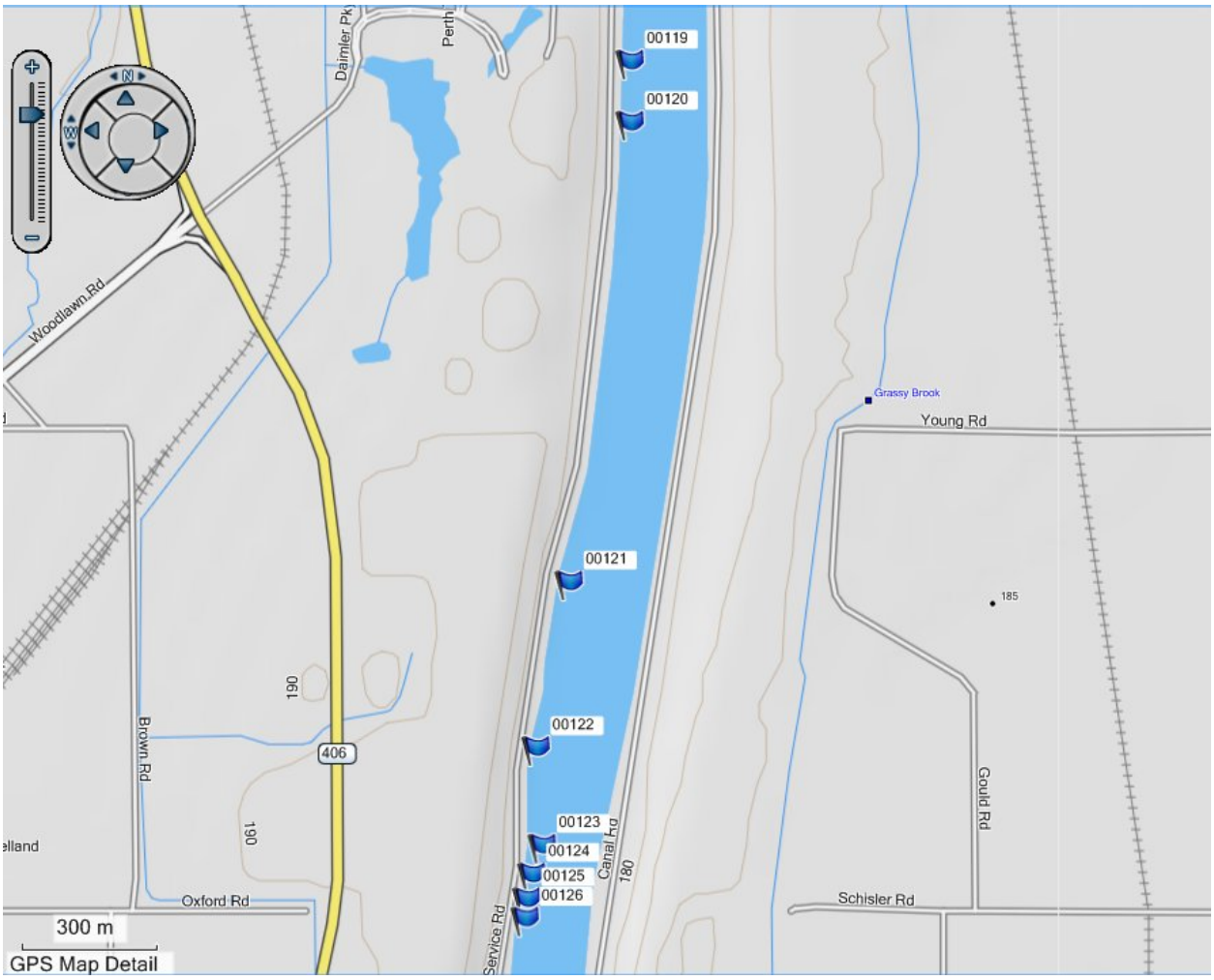
Way Points 108 to 110



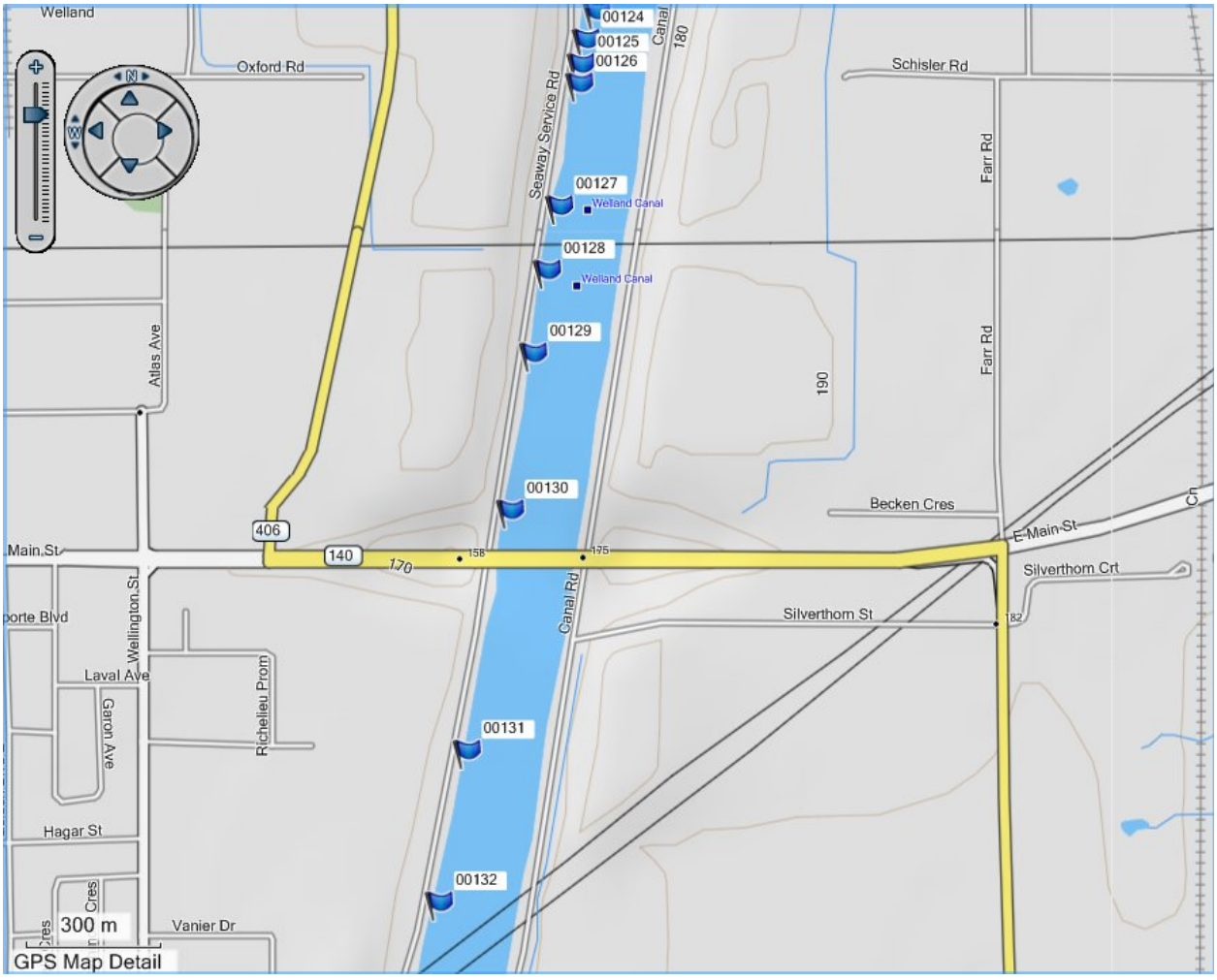
Way Points 112 to 119



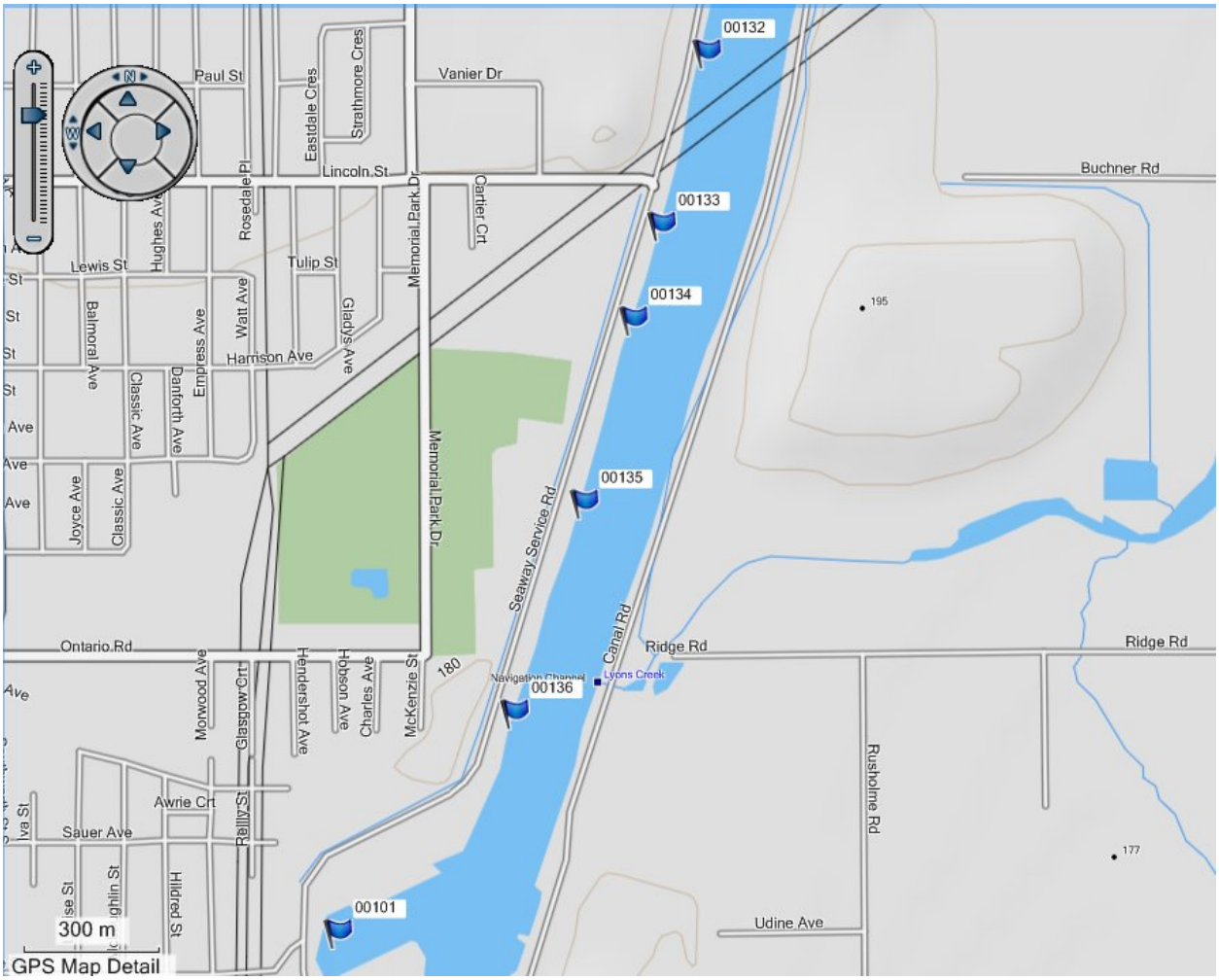
Way Points 119 to 126



Way Points 124 to 132



Way Points 132 to 136



5.0 Photographs

REACH 7 BANKS

EROSION OF EAST BANK SOUTH OF BRIDGE 10 ABUTMENT ADJACENT TO SERVICE ROAD AND AT UTILITY POLE



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-574	2014/08/07	M. Bowden	2014101574.jpg

REACH 7 BANKS

EROSION OF EAST BANK SOUTH OF BRIDGE 10 ABUTMENT ADJACENT TO SERVICE ROAD AND AT UTILITY POLE



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-575	2014/08/07	M. Bowden	2014101575.jpg

REACH 7 BANKS

EROSION OF EAST BANK ADJACENT TO CONCRETE STAIRS AT NORTH SIDE OF BRIDGE 11 ABUTMENT



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-576	2014/08/07	M. Bowden	2014101576.jpg

REACH 7 BANKS

EROSION OF EAST BANK ADJACENT TO CONCRETE STAIRS AT NORTH SIDE OF BRIDGE 11 ABUTMENT AND STAIRS BECOMING UNDERMINED



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-577	2014/08/07	M. Bowden	2014101577.jpg

REACH 7 BANKS

TOP OF OF EAST BANK AT BRIDGE 11 IMMEDIATELY ADJACENT TO SERVICE ROAD



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-578	2014/08/07	M. Bowden	2014101578.jpg

REACH 7 BANKS

EROSION OF EAST BANK SOUTH OF PORT ROBINSON



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-590	2014/08/08	M. Bowden	2014101590.jpg

REACH 7 BANKS

EROSION OF EAST BANK SOUTH OF PORT ROBINSON



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-591	2014/08/08	M. Bowden	2014101591.jpg

REACH 7 BANKS
EROSION OF EAST BANK SOUTH AT WELLAND RIVER SYPHON



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-592	2014/08/08	M. Bowden	2014101592.jpg

REACH 7 BANKS

EROSION OF EAST BANK APPROXIMATELY 350 m SOUTH OF WELLAND RIVER SYPHON



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-593	2014/08/08	M. Bowden	2014101593.jpg

REACH 7 BANKS

EROSION OF EAST BANK APPROXIMATELY 750 m SOUTH OF WELLAND RIVER SYPHON



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-594	2014/08/08	M. Bowden	2014101594.jpg

REACH 7 BANKS

EROSION OF EAST BANK APPROXIMATELY 750 m SOUTH OF WELLAND RIVER SYPHON



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-595	2014/08/08	M. Bowden	2014101595.jpg

REACH 7 BANKS

EROSION OF EAST BANK APPROXIMATELY 2000 m SOUTH OF WELLAND RIVER SYPHON



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-597	2014/08/08	M. Bowden	2014101597.jpg

REACH 7 BANKS

EROSION OF EAST BANK AT AREA BETWEEN 1.4 AND 1.9 km NORTH OF EAST MAIN STREET TUNNEL



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-598	2014/08/08	M. Bowden	2014101598.jpg

REACH 7 BANKS

EROSION OF EAST BANK AT AREA BETWEEN 1.4 AND 1.9 km NORTH OF EAST MAIN STREET TUNNEL



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-599	2014/08/08	M. Bowden	2014101599.jpg

REACH 7 BANKS

EROSION OF EAST BANK AT AREA BETWEEN 1.4 AND 1.9 km NORTH OF EAST MAIN STREET TUNNEL



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-600	2014/08/08	M. Bowden	2014101600.jpg

REACH 7 BANKS

EROSION OF EAST BANK AND LEANING UTILITY POLE AT AREA BETWEEN 1.4 AND 1.9 km NORTH OF EAST MAIN STREET TUNNEL



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-601	2014/08/08	M. Bowden	2014101601.jpg

REACH 7 BANKS

EROSION OF EAST BANK AND LEANING UTILITY POLE 1.4 km NORTH OF EAST MAIN STREET TUNNEL



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-602	2014/08/08	M. Bowden	2014101602.jpg

REACH 7 BANKS

EROSION OF EAST BANK AND LEANING UTILITY POLE 1.3 km NORTH OF EAST MAIN STREET TUNNEL



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-603	2014/08/08	M. Bowden	2014101603.jpg

REACH 7 BANKS

EROSION OF EAST BANK AT AREA 920 m TO 1060 m NORTH OF EAST MAIN STREET TUNNEL



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-604	2014/08/08	M. Bowden	2014101604.jpg

REACH 7 BANKS

EROSION OF EAST BANK AT AREA 920 m TO 1060 m NORTH OF EAST MAIN STREET TUNNEL



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-605	2014/08/08	M. Bowden	2014101605.jpg

REACH 7 BANKS

EROSION OF EAST BANK AT AREA 920 m TO 1060 m NORTH OF EAST MAIN STREET TUNNEL



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-606	2014/08/08	M. Bowden	2014101606.jpg

REACH 7 BANKS

EROSION OF EAST BANK AT AREA 375 m TO 850 m NORTH OF EAST MAIN STREET TUNNEL



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-607	2014/08/08	M. Bowden	2014101607.jpg

REACH 7 BANKS

EROSION OF EAST BANK AT AREA 375 m TO 850 m NORTH OF EAST MAIN STREET TUNNEL



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-608	2014/08/08	M. Bowden	2014101608.jpg

REACH 7 BANKS

EROSION OF EAST BANK AT EAST MAIN STREET TUNNEL



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-609	2014/08/08	M. Bowden	2014101609.jpg

REACH 7 BANKS

EROSION OF EAST BANK AT EAST MAIN STREET TUNNEL



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-610	2014/08/08	M. Bowden	2014101610.jpg

REACH 7 BANKS

EROSION AND SLIPPAGE OF EAST BANK APPROXIMATELY 1.5 km SOUTH OF EAST MAIN STREET TUNNEL



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-611	2014/08/08	M. Bowden	2014101611.jpg

REACH 7 BANKS

EROSION AND SLIPPAGE OF EAST BANK AT AREA APPROXIMATELY 1.6 TO 1.9 km SOUTH OF EAST MAIN STREET TUNNEL



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-612	2014/08/08	M. Bowden	2014101612.jpg

REACH 7 BANKS

EROSION OF EAST BANK AT AREA APPROXIMATELY 1.6 TO 1.9 km SOUTH OF EAST MAIN STREET TUNNEL



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-613	2014/08/08	M. Bowden	2014101613.jpg

REACH 7 BANKS

EROSION OF EAST BANK AT AREA APPROXIMATELY 1.6 TO 1.9 km SOUTH OF EAST MAIN STREET TUNNEL



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-614	2014/08/08	M. Bowden	2014101614.jpg

REACH 7 BANKS
EROSION OF EAST BANK OPPOSITE DOCK 10 BASIN



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-615	2014/08/08	M. Bowden	2014101615.jpg

REACH 7 BANKS

EROSION OF EAST BANK AT UTILITY POLE OPPOSITE DOCK 10 BASIN



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-616	2014/08/08	M. Bowden	2014101616.jpg

REACH 7 BANKS
EROSION OF EAST BANK OPPOSITE DOCK 10 BASIN



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-617	2014/08/08	M. Bowden	2014101617.jpg

REACH 7 BANKS

EROSION OF WEST BANK 650 m SOUTH OF BRIDGE 10 BETWEEN AREAS OF NEWER RIP RAP



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-900	2014/11/04	M. Bowden	2014101900.jpg

REACH 7 BANKS

EROSION OF WEST BANK JUST SOUTH OF HYDRO INTAKE CHANNEL NORTH OF BRIDGE 11



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-902	2014/11/04	M. Bowden	2014101902.jpg

REACH 7 BANKS
EROSION OF WEST BANK 240 m NORTH OF BRIDGE 11



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-903	2014/11/04	M. Bowden	2014101903.jpg

REACH 7 BANKS

EROSION OF WEST BANK AT NORTH SIDE OF HYDRO INTAKE CHANNEL



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-905	2014/11/04	M. Bowden	2014101905.jpg

REACH 7 BANKS

EROSION OF EAST BANK 2000 M SOUTH OF RAMEY'S BEND CHANNEL



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-908	2014/11/12	M. Bowden	2014101908.jpg

REACH 7 BANKS

EROSION OF EAST BANK 2800 m SOUTH OF RAMEY'S BEND CHANNEL



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-909	2014/11/12	M. Bowden	2014101909.jpg

REACH 7 BANKS

EROSION OF EAST BANK AT LYON'S CREEK OUTFALL CULVERTS



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-910	2014/11/12	M. Bowden	2014101910.jpg

REACH 7 BANKS
EROSION OF EAST BANK 1100 m SOUTH OF TOWNLINE TUNNEL



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-911	2014/11/12	M. Bowden	2014101911.jpg

REACH 7 BANKS

EROSION OF EAST BANK AT NORTH TOWNLINE TUNNEL PERIPHERAL DRAIN OUTFALL CULVERT



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-912	2014/11/12	M. Bowden	2014101912.jpg

REACH 7 BANKS

EROSION OF EAST BANK 500 m NORTH OF TOWNLINE TUNNEL



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-913	2014/11/12	M. Bowden	2014101913.jpg

REACH 7 BANKS
EROSION OF WEST BANK OF DOCK 10 BASIN



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-914	2014/11/12	M. Bowden	2014101914.jpg

REACH 7 BANKS

EROSION OF WEST BANK 400 m SOUTH OF TOWNLINE TUNNEL



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-915	2014/11/12	M. Bowden	2014101915.jpg

REACH 7 BANKS
EROSION OF WEST BANK 750 m SOUTH OF TOWNLINE TUNNEL



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-916	2014/11/12	M. Bowden	2014101916.jpg

REACH 7 BANKS

EROSION OF WEST BANK AT NORTH SIDE OF FOURTH CANAL CHANNEL / WELLAND BY-PASS CHANNEL INTERSECTION



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-917	2014/11/12	M. Bowden	2014101917.jpg

REACH 7 BANKS

EROSION OF EAST SIDE OF FOURTH CANAL CHANNEL JUST NORTH OF INTERSECTION WITH WELLAND BY-PASS CHANNEL



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-918	2014/11/12	M. Bowden	2014101918.jpg

REACH 7 BANKS

SLIPPAGE OF WEST BANK OF FOURTH CANAL CHANNEL AT DOCK 11 FACILITY



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-919	2014/11/12	M. Bowden	2014101919.jpg

REACH 7 BANKS
SLIPPAGE OF WEST BANK OF FOURTH CANAL CHANNEL AT DOCK 11 FACILITY



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-920	2014/11/12	M. Bowden	2014101920.jpg

REACH 7 BANKS

EROSION OF WEST BANK OF FOURTH CANAL CHANNEL AT DOCK 11 FACILITY



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-921	2014/11/12	M. Bowden	2014101921.jpg

REACH 7 BANKS

EROSION OF WEST BANK JUST NORTH OF OLD FOURTH CANAL CHANNEL AT PORT ROBINSON



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-922	2014/11/12	M. Bowden	2014101922.jpg

REACH 7 BANKS

EROSION OF WEST BANK JUST NORTH OF OLD FOURTH CANAL CHANNEL AT PORT ROBINSON



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-923	2014/11/12	M. Bowden	2014101923.jpg

REACH 7 BANKS

EROSION OF WEST BANK BETWEEN OLD FOURTH CANAL CHANNEL AND WELLAND RIVER SYPHON



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-924	2014/11/12	M. Bowden	2014101924.jpg

REACH 7 BANKS

EROSION OF WEST BANK BETWEEN OLD FOURTH CANAL CHANNEL AND WELLAND RIVER SYPHON



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-925	2014/11/12	M. Bowden	2014101925.jpg

REACH 7 BANKS

EROSION OF WEST BANK 500 m SOUTH OF WELLAND RIVER SYPHON



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-926	2014/11/12	M. Bowden	2014101926.jpg

REACH 7 BANKS

EROSION OF WEST BANK 500 m SOUTH OF WELLAND RIVER SYPHON



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-927	2014/11/12	M. Bowden	2014101927.jpg

REACH 7 BANKS

EROSION OF WEST BANK 1100 m TO 2100 m SOUTH OF WELLAND RIVER



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-928	2014/11/12	M. Bowden	2014101928.jpg

REACH 7 BANKS

EROSION OF WEST BANK 1100 m TO 2100 m SOUTH OF WELLAND RIVER



IMSS Ref. No.	Date	Photo. By	Image File
2014-101-929	2014/11/12	M. Bowden	2014101929.jpg

Appendix 1

Lat.	Long.			Way point
43.08419	-79.208739	166.980179	2014-08-07T17:57:48Z	00027
43.082835	-79.208955	167.353989	2014-08-07T18:00:16Z	00028
43.076688	-79.209939	166.716492	2014-08-07T18:04:58Z	00029
43.075834	-79.209989	167.597824	2014-08-07T18:07:55Z	00030
43.074609	-79.210169	167.516678	2014-08-07T18:10:03Z	00031
43.033546	-79.211534	178.809753	2014-08-08T13:32:30Z	00038
43.033224	-79.211463	177.668365	2014-08-08T13:33:24Z	00039
43.032079	-79.211469	177.833496	2014-08-08T13:35:08Z	00040
43.032603	-79.211523	177.74971	2014-08-08T13:35:55Z	00041
43.028892	-79.211412	176.592941	2014-08-08T13:39:19Z	00042
43.028292	-79.211375	177.986725	2014-08-08T13:40:52Z	00043
43.025605	-79.211343	177.196274	2014-08-08T13:45:42Z	00044
43.0222	-79.211238	175.772079	2014-08-08T13:49:50Z	00045
43.021232	-79.211229	176.084488	2014-08-08T13:50:56Z	00046
43.020144	-79.211251	175.693054	2014-08-08T13:51:55Z	00047
43.017662	-79.21129	176.853867	2014-08-08T13:54:17Z	00048
43.01706	-79.211238	176.616791	2014-08-08T13:55:21Z	00049
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