Appendix D

Wetland Functions and Values Assessment

Wetland Functions and Values
S.P. 1116-22 (Minnesota Highway 371)
Nisswa to Pine River
November 21, 2003

Early in 2003, the MnDOT District 3 Biologist completed a functions and values analysis of the wetland communities associated with the proposed improvements to Trunk Highway (TH) 371 between Nisswa and Pine River. The Minnesota Routine Assessment Method (MnRAM) for Evaluating Wetland Functions (version 2.0) was used for the analysis.

Wetlands in the project area are generally in very good to excellent condition. Additionally, a large percentage of the pre-settlement wetlands are still intact in the region. Crow Wing and Cass Counties have 86.8% and 91.4% of the pre-settlement wetland base remaining (*Anderson, Jeffrey P. and William J. Craig. 1984 Growing Energy Crops on Minnesota's Wetlands: The Land Use Perspective. University of Minnesota Center for Urban and Regional Affairs. Publication No. CURA 84-3).*

Early screening and analysis has eliminated the most environmentally damaging alternatives, leaving four alternatives that are very similar regarding wetland impacts.

MnRAMs were completed on representative basins and then applied to similar wetlands within the project limits. Assessments were completed on the following wetlands.

Wetland #1- large type 6 (PSS1C), alder thicket
Applies to: 15, 21, 34, 34A, 36, 52, 62, 63A, 74

Wetland #2- type 7 (PSS4B), tamarack swamp
Applies to: 3, 74A

Wetland #7- type 7 (PFO1B), hardwood swamp
Applies to: 64, 71

Wetland #9- type 2 (PEMB), isolated sedge meadow
Applies to: 10, 11, 12, 13, 14, 16, 17, 20, 22, 23, 28, 40, 44, 50, 51, 57, 58, 73

Wetland #35- type 2 (PEMB), flow through
Applies to: 36

Wetland #18- type 6 (PSS1C), shrub carr
Applies to: 2A, 4, 8, 18, 37A, 42, 43, 45, 47, 49, 53, 54, 56, 59, 60, 68, 70, 72

Wetland #24- type 3 (PEMC), isolated shallow marsh
Applies to: 5, 6, 19, 24, 25, 26, 27, 29, 30, 32, 33, 66, 37, 41, 45A, 46, 48, 55, 58A, 61, 75

Wetland #31- type 8 (PSS3B), open bog
Applies to: 27A, 32A, 73A

Wetland #35- type 2 (PEMB), fresh wet meadow
Applies to: 38, 39, 67, 69

Results of the MnRAM analyses are summarized on the attached tables. All basins that may be impacted by each alternative are sorted and ranked. Each score of medium or high was tabulated to help determine if wetland impacts are a determining factor in the preferred alternative decision.

	MED	HIGH
Alternative 2	81	30
Alternative 3	78	29
Alternative 4	79	32
Alternative 5	80	33

The most significant finding is that the remaining alternatives are very similar in both quantity and quality of potential wetland affects. It should also be noted that additional avoidance and minimization measures will be applied as the remaining alternatives are refined.

ALTERNATIVE #2
EXISTING ALIGNMENT
(Impacted Wetlands/Waters 11/07/03)
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Wetland	Type	Vegetable Diversity	Maint. of Hydrologic Regime	Flood/ Stormwater/ Attenuation	Water Quality Protection	Shore-line Protection	Ground-water Interaction	Wildlife Habitat	Fishery Habitat	Aesth./ Rec./Educ./ Cultural	Com-mercial Uses
1	6 (lg)	**M**	L	L	**M**	L		**H**	**MH**	**M**	NA
Edna Lake											
2	7 Tam. Swamp	**H**	**H**	L	L	NA		**M**	L	**M**	NA
2A	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
2B											
4	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
6	3(isol)	L	L	L	LM	LM		L	NA	L	NA
W. Twin Lake											
7	7 Hrdwd Swamp	**H**	**H**	L	**M**	**M**		**M**	NA	L	NA
9	2 (isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
10	2 (isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
11	2 (isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
14	2 (isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
15	6 (lg)	**M**	L	L	**M**	L		**H**	**MH**	**M**	NA
18	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
20	2 (isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
21	6 (lg)	**M**	L	L	**M**	**M**		**H**	**MH**	**M**	NA
24	3(isol)	L	L	L	LM	NA		L	NA	L	NA
25	3(isol)	L	L	L	LM	NA		L	NA	L	NA

ALTERNATIVE #2
EXISTING ALIGNMENT
(Impacted Wetlands/Waters 11/07/03)
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Wetland	Type	Vegetable Diversity	Maint. of Hydrologic Regime	Flood/ Stormwater/ Attenuation	Water Quality Protection	Shore-line Protection	Ground-water Interaction	Wildlife Habitat	Fishery Habitat	Aesth./ Rec./Educ./ Cultural	Com-mercial Uses
32	3(isol)	L	L	L	LM	NA		L	NA	L	NA
34	6 (lg)	**M**	L	L	**M**	L		**H**	**MH**	**M**	NA
36	6 (lg)	**M**	**M**	L	**M**	L		**H**	**MH**	**M**	NA
39	2/3	L	**M**	L	**M**	L		**M**	L	L	NA
Hay Creek											
41	3(isol)	L	L	L	LM	NA		L	NA	L	NA
44	2 (isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
46	3(isol)	L	L	L	LM	NA		L	NA	L	NA
48	3(isol)	L	L	L	LM	NA		L	NA	L	NA
50	2 (isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
52	6 (lg)	**M**	L	L	**M**	L		**H**	**MH**	**M**	NA
53	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
54	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
56	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
59	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
62	6 (lg)	**M**	L	L	**M**	L		**H**	**MH**	**M**	NA
Pine River											
64	7 Hrdwd Swamp	**H**	**H**	L	**M**	**M**		**M**	NA	L	NA
65	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
67	2/3	L	**M**	L	**M**	L		**M**	L	L	NA
68	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA

ALTERNATIVE #2
EXISTING ALIGNMENT
(Impacted Wetlands/Waters 11/07/03)
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Wetland	Type	Vegetable Diversity	Maint. of Hydrologic Regime	Flood/ Stormwater/ Attenuation	Water Quality Protection	Shore-line Protection	Ground-water Interaction	Wildlife Habitat	Fishery Habitat	Aesth./ Rec./Educ./ Cultural	Com-mercial Uses
69	2/3	L	**M**	L	**M**	L		**M**	L	L	NA
70	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA

M + MH = 81 **H = 30**

ALTERNATIVE #2
EXISTING ALIGNMENT

Wetland #	County	Sect.-Twp.-Range	Watershed	Type C-39	Type Cowardin	Dominant Vegetation	Wetland Size	Acreage of Impact	% Impacted	Topo Setting	In Shoreland Wetland Protection Zone or Floodplain of a Watercourse (give distance in feet)
1	Crow Wing	11-135-29	12 CW R.	6	PSS1C	sp.alder,sedge	45.00	3.53	8%	FP	adj. To Cullen Br.
Edna Lake	Crow Wing	2-135-29	12 CW R.		L1UBH		153.00	0.05	0%	ISO	**Edna Lake**
2	Crow Wing	2-135-29	12 CW R.	7	PSS4B	tamarack, b spruce	9.30	0.20	2%	ISO	500' to L Cullen, 700' to W Twin
2A	Crow Wing	2-135-29	12 CW R.	6	PSS1C	sp alder	2.00	0.63	32%	ISO	500' to L Cullen, 700' to W Twin
2B	Crow Wing	2-135-29	12 CW R.	4	PUBG		2.00	1.21	60%	ISO	500' to L Cullen, 700' to W Twin
4	Crow Wing	3-135-29	12 CW R.	6	PSS1C	willow	0.90	0.07	8%	ISO	600" to W Twin
6	Crow Wing	35-136-29	12 CW R.	3	PEMC	typha	0.30	0.04	13%	FP	May be lakebed, WTL
W Twin Lk	Crow Wing	35-136-29	12 CW R.		L1UBH		117.00	0.22	0%	ISO	**West Twin Lake**
7	Crow Wing	35-136-29	12 CW R.	7	PFO1B		0.30	0.01	2%	FP	may be lakebed,WTL
9	Crow Wing	26-136-29	12 CW R.	2	PEMB	sedge	0.72	0.72	100%	ISO	500' to W Twin L.
10	Crow Wing	26-136-29	12 CW R.	2	PEMB	sedge	0.05	0.05	100%	ISO	
11	Crow Wing	27-136-29	12 CW R.	2	PEMB	sedge	0.30	0.00	0%	ISO	
14	Crow Wing	26-136-29	12 CW R.	2	PEMB	sedge	0.24	0.03	12%	ISO	
15	Crow Wing	27-136-29	12 CW R.	6	PSS1B		14.30	0.77	5%	ISO	
18	Crow Wing	26-136-29	12 CW R.	6	PSS1C		0.54	0.33	61%	ISO	
20	Crow Wing	10-136-29	12 CW R.	1	PEMA		0.40	0.10	25%	ISO	200' to Sibley L.
21	Crow Wing	10-136-29	12 CW R.	6	PSS1C		19.00	0.81	4%	FP	may be lakebed, Sibley
24	Crow Wing	10-136-29	11 Pine R.	3	PEMC	typha	0.30	0.05	17%	ISO	
25	Crow Wing	3-136-29	11 Pine R.	3	PEMC		2.20	0.05	2%	ISO	
32	Crow Wing	34-137-29	11 Pine R.	3	PEMC		54.00	0.03	0%	ISO	
34	Crow Wing	34-137-29	11 Pine R.	6	PSS1C		92.00	3.06	3%	TRIB	
36	Crow Wing	27-137-29	11 Pine R.	6	PSS1C		9.50	0.32	3%	FT	
39	Crow Wing	27-137-29	11 Pine R.	3	PEMC		2.10	0.28	13%	FT	FP of Hay Cr.
Hay Creek	Crow Wing	27-137-29	11 Pine R.		R2UBH		1100'	channel	realign	R	**Hay Creek**
41	Crow Wing	22,27-137	11 Pine R.	3	PEMC		7.50	0.12	2%	ISO	
44	Cass	21-137-29	11 Pine R.	2	PEMB		0.20	0.12	60%	ISO	
46	Cass	21-137-29	11 Pine R.	3	PUBGx		3.40	0.75	22%	ISO	
48	Cass	21-137-29	11 Pine R.	3	PEMC		0.20	0.17	85%	ISO	
50	Cass	21-137-29	11 Pine R.	2	PEMB		0.05	0.04	80%	ISO	
52	Cass	16-137-29	11 Pine R.	6	PSS1C		230.00	4.92	2%	ISO	
53	Cass	16-137-29	11 Pine R.	6	PSS1C		0.80	0.80	100%	ISO	
54	Cass	16-137-29	11 Pine R.	6	PSS1C		1.20	0.03	2%	ISO	
56	Cass	16-137-29	11 Pine R.	6	PSS1C		1.62	1.62	100%	TRIB	
59	Cass	8-137-29	11 Pine R.	6	PSS1B		0.15	0.09	60%	FP	160' to Pine R.
62	Cass	8-137-29	11 Pine R.	6	PSS1C		2.00	0.25	12%	FP	adj to Pine R
Pine River	Cass	8-137-29	11 Pine R.		R2			0.00	0%	R	**Pine R.**
64	Cass	5-137-29	11 Pine R.	7	PFO1C		0.25	0.03	12%	ISO	
65	Cass	6-137-29	11 Pine R.	6	PSS1B		0.80	0.03	4%	ISO	
67	Cass	6-137-29	11 Pine R.	2	PEMB		0.35	0.35	100%	FP	adj to Norway Br.
68	Cass	6-137-29	11 Pine R.	6	PSS1C		0.09	0.00	0%	FP	adj to Norway Br.
69	Cass	6-137-29	11 Pine R.	2	PEMB		0.35	0.35	100%	FP	adj to Norway Br.
70	Cass	6-137-29	11 Pine R.	6	PSS1C		0.20	0.05	25%	FP	adj to Norway Br.
							Total	**22.28**			

Type	ISO	TRIB	FT	RIV	FP	TOTAL
1	0.1					0.1
2	0.96				0.7	1.66
3	1.17		0.28		0.04	1.49
4	1.21					1.21
5	0					
6	7.58	4.68	0.32		4.73	17.31
7	0.23				0.01	0.24
8	0					
LAKE	0.27					0.27
TOTAL						22.28

ALTERNATIVE #3
EXISTING ALIGNMENT WITH A PEQUOT LAKES BYPASS
(Impacted Wetlands/Waters 11/07/03)
Page 1

Wetland	Type	Vegetable Diversity	Maint. of Hydrologic Regime	Flood/ Stormwater/ Attenuation	Water Quality Protection	Shore-line Protection	Ground-water Interaction	Wildlife Habitat	Fishery Habitat	Aesth./ Rec./Educ./ Cultural	Com-mercial Uses
1	6 (lg)	**M**	L	L	**M**	L		**H**	**MH**	**M**	NA
Edna Lake											
2	7 Tam. Swamp	**H**	**H**	L	L	NA		**M**	L	**M**	NA
2A	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
2B											
4	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
6	3(isol)	L	L	L	LM	LM		L	NA	L	NA
W. Twin Lake											
7	7 Hrdwd Swamp	**H**	**H**	L	**M**	**M**		**M**	NA	L	NA
9	2 (isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
10	2 (isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
11	2 (isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
14	2 (isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
15	6 (lg)	**M**	L	L	**M**	L		**H**	**MH**	**M**	NA
18	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
33	3(isol)	L	L	L	LM	NA		L	NA	L	NA
34	6 (lg)	**M**	L	L	**M**	L		**H**	**MH**	**M**	NA
36	6 (lg)	**M**	**M**	L	**M**	L		**H**	**MH**	**M**	NA
39	2/3	L	**M**	L	**M**	L		**M**	L	L	NA

ALTERNATIVE #3
EXISTING ALIGNMENT WITH A PEQUOT LAKES BYPASS
(Impacted Wetlands/Waters 11/07/03)
Page 2

Wetland	Type	Vegetable Diversity	Maint. of Hydrologic Regime	Flood/ Stormwater/ Attenuation	Water Quality Protection	Shore-line Protection	Ground-water Interaction	Wildlife Habitat	Fishery Habitat	Aesth./ Rec./Educ./ Cultural	Com-mercial Uses
Hay Creek											
41	3(isol)	L	L	L	LM	NA		L	NA	L	NA
44	2 (isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
46	3(isol)	L	L	L	LM	NA		L	NA	L	NA
48	3(isol)	L	L	L	LM	NA		L	NA	L	NA
50	2 (isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
52	6 (lg)	**M**	L	L	**M**	L		**H**	**MH**	**M**	NA
53	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
54	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
56	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
59	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
62	6 (lg)	**M**	L	L	**M**	L		**H**	**MH**	**M**	NA
Pine River											
64	7 Hrdwd Swamp	**H**	**H**	L	**M**	**M**		**M**	NA	L	NA
65	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
67	2/3	L	**M**	L	**M**	L		**M**	L	L	NA
68	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
69	2/3	L	**M**	L	**M**	L		**M**	L	L	NA
70	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
77	2 (isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA

ALTERNATIVE #3
EXISTING ALIGNMENT WITH A PEQUOT LAKES BYPASS
(Impacted Wetlands/Waters 11/07/03)
Page 3

M + MH = 78 **H = 29**

ALTERNATIVE #3
EXISTING ALIGNMENT WITH A PEQUOT LAKES BYPASS

Wetland #	County	Sect.-Twp.-Range	Watershed	Type C-39	Type Cowardin	Dominant Vegetation	Wetland Size	Acreage of Impact	% Impacted	Topo Setting	In Shoreland Wetland Protection Zone or Floodplain of a Watercourse (give distance in feet)
1	Crow Wing	11-135-29	12 CW R.	6	PSS1C	sp.alder,sedge	45.00	3.52	8%	FP	adj. To Cullen Br.
Edna Lake	Crow Wing	2-135-29	12 CW R.		L1UBH		153.00	0.05	0%	ISO	**Edna Lake**
2	Crow Wing	2-135-29	12 CW R.	7	PSS4B	tamarack, b spruce	9.30	0.20	2%	ISO	500' to L Cullen, 700' to W Twin
2A	Crow Wing	2-135-29	12 CW R.	6	PSS1C	sp alder	2.00	0.63	32%	ISO	500' to L Cullen, 700' to W Twin
2B	Crow Wing	2-135-29	12 CW R.	4	PUBG		2.00	1.21	60%	ISO	500' to L Cullen, 700' to W Twin
4	Crow Wing	3-135-29	12 CW R.	6	PSS1C	willow	0.90	0.07	8%	ISO	600" to W Twin
6	Crow Wing	35-136-29	12 CW R.	3	PEMC	typha	0.30	0.04	13%	FP	May be lakebed, WTL
W Twin Lk	Crow Wing	35-136-29	12 CW R.		L1UBH		117.00	0.22	0%	ISO	**West Twin Lake**
7	Crow Wing	35-136-29	12 CW R.	7	PFO1B		0.30	0.01	2%	FP	may be lakebed,WTL
9	Crow Wing	26-136-29	12 CW R.	2	PEMB	sedge	0.72	0.72	100%	ISO	500' to W Twin L.
10	Crow Wing	26-136-29	12 CW R.	2	PEMB	sedge	0.05	0.05	100%	ISO	
11	Crow Wing	27-136-29	12 CW R.	2	PEMB	sedge	0.30	0.00	0%	ISO	
14	Crow Wing	26-136-29	12 CW R.	2	PEMB	sedge	0.24	0.03	12%	ISO	
15	Crow Wing	27-136-29	12 CW R.	6	PSS1B		14.30	0.77	5%	ISO	
18	Crow Wing	26-136-29	12 CW R.	6	PSS1C		0.54	0.33	61%	ISO	
77	Crow Wing	2-136-29	11 Pine R.	2	PEMB		10.00	0.51	5%	ISO	
33	Crow Wing	34-137-29	11 Pine R.	3	PEMC		0.50	0.30	60%	ISO	
34	Crow Wing	34-137-29	11 Pine R.	6	PSS1C		92.00	4.69	5%	TRIB	
36	Crow Wing	27-137-29	11 Pine R.	6	PSS1C		9.50	3.52	37%	FT	
39	Crow Wing	27-137-29	11 Pine R.	3	PEMC		2.10	0.28	13%	FT	FP of Hay Cr.
Hay Creek	Crow Wing	27-137-29	11 Pine R.		R2UBH		1100'	channel	realign	R	**Hay Creek**
41	Crow Wing	22,27-137	11 Pine R.	3	PEMC		7.50	0.12	2%	ISO	
44	Cass	21-137-29	11 Pine R.	2	PEMB		0.20	0.12	60%	ISO	
46	Cass	21-137-29	11 Pine R.	3	PUBGx		3.40	0.75	22%	ISO	
48	Cass	21-137-29	11 Pine R.	3	PEMC		0.20	0.17	85%	ISO	
50	Cass	21-137-29	11 Pine R.	2	PEMB		0.05	0.04	80%	ISO	
52	Cass	16-137-29	11 Pine R.	6	PSS1C		230.00	4.92	2%	ISO	
53	Cass	16-137-29	11 Pine R.	6	PSS1C		0.80	0.80	100%	ISO	
54	Cass	16-137-29	11 Pine R.	6	PSS1C		1.20	0.03	2%	ISO	
56	Cass	16-137-29	11 Pine R.	6	PSS1C		1.62	1.62	100%	TRIB	
59	Cass	8-137-29	11 Pine R.	6	PSS1B		0.15	0.09	60%	FP	160' to Pine R.
62	Cass	8-137-29	11 Pine R.	6	PSS1C		2.00	0.25	12%	FP	adj to Pine R
Pine River	Cass	8-137-29	11 Pine R.		R2			0.00	0%	R	**Pine R.**
64	Cass	5-137-29	11 Pine R.	7	PFO1C		0.25	0.03	12%	ISO	
65	Cass	6-137-29	11 Pine R.	6	PSS1B		0.80	0.03	4%	ISO	
67	Cass	6-137-29	11 Pine R.	2	PEMB		0.35	0.35	100%	FP	adj to Norway Br.
68	Cass	6-137-29	11 Pine R.	6	PSS1C		0.09	0.00	0%	FP	adj to Norway Br.
69	Cass	6-137-29	11 Pine R.	2	PEMB		0.35	0.35	100%	FP	adj to Norway Br.
70	Cass	6-137-29	11 Pine R.	6	PSS1C		0.20	0.05	25%	FP	adj to Norway Br.
							Total	**26.87**			

TYPE	ISO	TRIB	FT	RIV	FP	TOTAL
1						
2	1.47				0.7	2.17
3	1.34		0.28		0.04	1.66
4	1.21					1.21
5						
6	7.58	6.31	3.52		3.91	21.32
7	0.23				0.01	0.24
8						
LAKE	0.27					0.27
TOTAL						26.87

ALTERNATIVE #4
EXISTING ALIGNMENT WITH A PEQUOT LAKES BYPASS AND A JENKINS BYPASS
(Impacted Wetlands/Waters 11/07/03)
Page 1

Wetland	Type	Vegetable Diversity	Maint. of Hydrologic Regime	Flood/ Stormwater/ Attenuation	Water Quality Protection	Shore-line Protection	Ground-water Interaction	Wildlife Habitat	Fishery Habitat	Aesth./ Rec./Educ./ Cultural	Com-mercial Uses
1	6 (lg)	**M**	L	L	**M**	L		**H**	**MH**	**M**	NA
Edna Lake											
2	7 Tam. Swamp	**H**	**H**	L	L	NA		**M**	L	**M**	NA
2A	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
2B											
4	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
6	3(isol)	L	L	L	LM	LM		L	NA	L	NA
W. Twin Lake											
7	7 Hrdwd Swamp	**H**	**H**	L	**M**	**M**		**M**	NA	L	NA
9	2 (isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
10	2 (isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
11	2 (isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
14	2 (isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
15	6 (lg)	**M**	L	L	**M**	L		**H**	**MH**	**M**	NA
18	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
22	2(isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
26	3(isol)	L	L	L	LM	NA		L	NA	L	NA
27	3(isol)	L	L	L	LM	NA		L	NA	L	NA
28	2(isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA

ALTERNATIVE #4
EXISTING ALIGNMENT WITH A PEQUOT LAKES BYPASS AND A JENKINS BYPASS
(Impacted Wetlands/Waters 11/07/03)
Page 2

Wetland	Type	Vegetable Diversity	Maint. of Hydrologic Regime	Flood/ Stormwater/ Attenuation	Water Quality Protection	Shore-line Protection	Ground-water Interaction	Wildlife Habitat	Fishery Habitat	Aesth./ Rec./Educ./ Cultural	Com-mercial Uses
29	3(isol)	L	L	L	LM	NA		L	NA	L	NA
30	3(isol)	L	L	L	LM	NA		L	NA	L	NA
31	8 open bog	**MH**	**H**	L	**M**	NA		**H**	L	L	L
32	3(isol)	L	L	L	LM	NA		L	NA	L	NA
34	6 (lg)	**M**	L	L	**M**	L		**H**	**MH**	**M**	NA
36	6 (lg)	**M**	**M**	L	**M**	L		**H**	**MH**	**M**	NA
Hay Creek											
40	2 (isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
41	3(isol)	L	L	L	LM	NA		L	NA	L	NA
44	2 (isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
46	3(isol)	L	L	L	LM	NA		L	NA	L	NA
48	3(isol)	L	L	L	LM	NA		L	NA	L	NA
50	2 (isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
52	6 (lg)	**M**	L	L	**M**	L		**H**	**MH**	**M**	NA
53	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
54	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
56	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
59	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
62	6 (lg)	**M**	L	L	**M**	L		**H**	**MH**	**M**	NA
Pine River											

ALTERNATIVE #4
EXISTING ALIGNMENT WITH A PEQUOT LAKES BYPASS AND A JENKINS BYPASS
(Impacted Wetlands/Waters 11/07/03)
Page 3

Wetland	Type	Vegetable Diversity	Maint. of Hydrologic Regime	Flood/ Stormwater/ Attenuation	Water Quality Protection	Shore-line Protection	Ground-water Interaction	Wildlife Habitat	Fishery Habitat	Aesth./ Rec./Educ./ Cultural	Com-mercial Uses
64	7 Hrdwd Swamp	**H**	**H**	L	**M**	**M**		**M**	NA	L	NA
65	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
67	2/3	L	**M**	L	**M**	L		**M**	L	L	NA
68	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
69	2/3	L	**M**	L	**M**	L		**M**	L	L	NA
70	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA

M + MH = 79 **H = 32**

ALTERNATIVE #4
EXISTING ALIGNMENT WITH A PEQUOT LAKES BYPASS AND A JENKINS BYPASS

Wetland #	County	Sect.-Twp.-Range	Watershed	Type C-39	Type Cowardin	Dominant Vegetation	Wetland Size	Acreage of Impact	% Impacted	Topo Setting	In Shoreland Wetland Protection Zone or Floodplain of a Watercourse (give distance in feet)
1	Crow Wing	11-135-29	12 CW R.	6	PSS1C	sp.alder,sedge	45.00	3.52	8%	FP	adj. To Cullen Br.
Edna Lake	Crow Wing	2-135-29	12 CW R.		L1UBH		153.00	0.05	0%	ISO	**Edna Lake**
2	Crow Wing	2-135-29	12 CW R.	7	PSS4B	tamarack, b spruce	9.30	0.20	2%	ISO	500' to L Cullen, 700' to W Twin
2A	Crow Wing	2-135-29	12 CW R.	6	PSS1C	sp alder	2.00	0.63	32%	ISO	500' to L Cullen, 700' to W Twin
2B	Crow Wing	2-135-29	12 CW R.	4	PUBG		2.00	1.21	60%	ISO	500' to L Cullen, 700' to W Twin
4	Crow Wing	3-135-29	12 CW R.	6	PSS1C	willow	0.90	0.07	8%	ISO	600" to W Twin
6	Crow Wing	35-136-29	12 CW R.	3	PEMC	typha	0.30	0.04	13%	FP	May be lakebed, WTL
W Twin Lk	Crow Wing	35-136-29	12 CW R.		L1UBH		117.00	0.22	0%	ISO	**West Twin Lake**
7	Crow Wing	35-136-29	12 CW R.	7	PFO1B		0.30	0.01	2%	FP	may be lakebed,WTL
9	Crow Wing	26-136-29	12 CW R.	2	PEMB	sedge	0.72	0.72	100%	ISO	500' to W Twin L.
10	Crow Wing	26-136-29	12 CW R.	2	PEMB	sedge	0.05	0.05	100%	ISO	
11	Crow Wing	27-136-29	12 CW R.	2	PEMB	sedge	0.30	0.00	0%	ISO	
14	Crow Wing	26-136-29	12 CW R.	2	PEMB	sedge	0.24	0.03	12%	ISO	
15	Crow Wing	27-136-29	12 CW R.	6	PSS1B		14.30	0.77	5%	ISO	
18	Crow Wing	26-136-29	12 CW R.	6	PSS1C		0.54	0.33	61%	ISO	
22	Crow Wing	3-136-29	11 Pine R.	2	PEMB		0.13	0.01	8%	ISO	
26	Crow Wing	3-136-29	11 Pine R.	3	PEMC		0.35	0.04	11%	ISO	
27	Crow Wing	3-136-29	11 Pine R.	3	PEMC		1.08	0.06	6%	ISO	
28	Crow Wing	3-136-29	11 Pine R.	2	PEMB		0.10	0.06	60%	ISO	
29	Crow Wing	3-136-29	11 Pine R.	3	PEMF		0.80	0.02	2%	ISO	
30	Crow Wing	34-137-29	11 Pine R.	3	PEMC		0.50	0.15	30%	ISO	
31	Crow Wing	3-136-29	11 Pine R.	8	PSS3B		10.90	0.02	0%	ISO	
32	Crow Wing	34-137-29	11 Pine R.	3	PEMC		54.00	6.28	12%	ISO	
34	Crow Wing	34-137-29	11 Pine R.	6	PSS1C		92.00	3.01	3%	TRIB	
36	Crow Wing	27-137-29	11 Pine R.	6	PSS1C		9.50	0.66	7%	FT	
Hay Creek	Crow Wing	27-137-29	11 Pine R.		R2UBH		340'	channel	realign	R	**Hay Creek**
40	Crow Wing	27-137-29	11 Pine R.	2	PEMB		0.20	0.06	30%	ISO	50' to Hay Cr.
41	Crow Wing	22,27-137	11 Pine R.	3	PEMC		7.50	0.05	1%	ISO	
44	Cass	21-137-29	11 Pine R.	2	PEMB		0.20	0.12	60%	ISO	
46	Cass	21-137-29	11 Pine R.	3	PUBGx		3.40	0.75	22%	ISO	
48	Cass	21-137-29	11 Pine R.	3	PEMC		0.20	0.17	85%	ISO	
50	Cass	21-137-29	11 Pine R.	2	PEMB		0.05	0.04	80%	ISO	
52	Cass	16-137-29	11 Pine R.	6	PSS1C		230.00	4.92	2%	ISO	
53	Cass	16-137-29	11 Pine R.	6	PSS1C		0.80	0.80	100%	ISO	
54	Cass	16-137-29	11 Pine R.	6	PSS1C		1.20	0.03	2%	ISO	
56	Cass	16-137-29	11 Pine R.	6	PSS1C		1.62	1.62	100%	TRIB	
59	Cass	8-137-29	11 Pine R.	6	PSS1B		0.15	0.09	60%	FP	160' to Pine R.
62	Cass	8-137-29	11 Pine R.	6	PSS1C		2.00	0.25	12%	FP	adj to Pine R
Pine River	Cass	8-137-29	11 Pine R.		R2			0.00	0%	R	**Pine R.**
64	Cass	5-137-29	11 Pine R.	7	PFO1C		0.25	0.03	12%	ISO	
65	Cass	6-137-29	11 Pine R.	6	PSS1B		0.80	0.03	4%	ISO	
67	Cass	6-137-29	11 Pine R.	2	PEMB		0.35	0.35	100%	FP	adj to Norway Br.
68	Cass	6-137-29	11 Pine R.	6	PSS1C		0.09	0.00	0%	FP	adj to Norway Br.
69	Cass	6-137-29	11 Pine R.	2	PEMB		0.35	0.35	100%	FP	adj to Norway Br.
70	Cass	6-137-29	11 Pine R.	6	PSS1C		0.20	0.05	25%	FP	adj to Norway Br.
							Total	**27.87**			

	ISO	TRIB	FT	RIV	FP	TOTAL
Type						
1						
2	**1.09**				**0.7**	**1.79**
3	**7.52**				**0.04**	**7.56**
4	**1.21**					**1.21**
5						
6	**7.58**	**4.63**	**0.66**		**3.91**	**16.78**
7	**0.23**				**0.01**	**0.24**
8	**0.02**					**0.02**
LAKE	**0.27**					**0.27**
TOTAL						**27.87**

ALTERNATIVE #5
EXISTING ALIGNMENT WITH A JENKINS BYPASS
(Impacted Wetlands/Waters 11/07/03)
Page 1

Wetland	Type	Vegetable Diversity	Maint. of Hydrologic Regime	Flood/ Stormwater/ Attenuation	Water Quality Protection	Shore-line Protection	Ground-water Interaction	Wildlife Habitat	Fishery Habitat	Aesth./ Rec./Educ./ Cultural	Com-mercial Uses
1	6 (lg)	**M**	L	L	**M**	L		**H**	**MH**	**M**	NA
Edna Lake											
2	7 Tam. Swamp	**H**	**H**	L	L	NA		**M**	L	**M**	NA
2A	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
2B											
4	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
6	3(isol)	L	L	L	LM	LM		L	NA	L	NA
W. Twin Lake											
7	7 Hrdwd Swamp	**H**	**H**	L	**M**	**M**		**M**	NA	L	NA
9	2 (isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
10	2 (isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
11	2 (isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
14	2 (isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
15	6 (lg)	**M**	L	L	**M**	L		**H**	**MH**	**M**	NA
18	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
20	2(isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
21	6 (lg)	**M**	L	L	**M**	**M**		**H**	**MH**	**M**	NA
24	3(isol)	L	L	L	LM	NA		L	NA	L	NA
25	3(isol)	L	L	L	LM	NA		L	NA	L	NA

ALTERNATIVE #5
EXISTING ALIGNMENT WITH A JENKINS BYPASS
(Impacted Wetlands/Waters 11/07/03)
Page 2

Wetland	Type	Vegetable Diversity	Maint. of Hydrologic Regime	Flood/ Stormwater/ Attenuation	Water Quality Protection	Shore-line Protection	Ground-water Interaction	Wildlife Habitat	Fishery Habitat	Aesth./ Rec./Educ./ Cultural	Com-mercial Uses
26	3(isol)	L	L	L	LM	NA		L	NA	L	NA
27	3(isol)	L	L	L	LM	NA		L	NA	L	NA
28	2(isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
29	3(isol)	L	L	L	LM	NA		L	NA	L	NA
30	3(isol)	L	L	L	LM	NA		L	NA	L	NA
31	8 open bog	**MH**	**H**	L	**M**	NA		**H**	L	L	L
32	3(isol)	L	L	L	LM	NA		L	NA	L	NA
34	6 (lg)	**M**	L	L	**M**	L		**H**	**MH**	**M**	NA
36	6 (lg)	**M**	**M**	L	**M**	L		**H**	**MH**	**M**	NA
Hay Creek											
40	2(isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
41	3(isol)	L	L	L	LM	NA		L	NA	L	NA
44	2 (isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
46	3(isol)	L	L	L	LM	NA		L	NA	L	NA
48	3(isol)	L	L	L	LM	NA		L	NA	L	NA
50	2 (isol)	**H**	**M**	L	L	NA		**MH**	NA	L	NA
52	6 (lg)	**M**	L	L	**M**	L		**H**	**MH**	**M**	NA
53	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
54	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
56	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA

ALTERNATIVE #5
EXISTING ALIGNMENT WITH A JENKINS BYPASS
(Impacted Wetlands/Waters 11/07/03)
Page 3

Wetland	Type	Vegetable Diversity	Maint. of Hydrologic Regime	Flood/ Stormwater/ Attenuation	Water Quality Protection	Shore-line Protection	Ground-water Interaction	Wildlife Habitat	Fishery Habitat	Aesth./ Rec./Educ./ Cultural	Com-mercial Uses
59	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
62											
Pine River											
64	7 Hrdwd Swamp	**H**	**H**	L	**M**	**M**		**M**	NA	L	NA
65	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
67	2/3	L	**M**	L	**M**	L		**M**	L	L	NA
68	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA
69	2/3	L	**M**	L	**M**	L		**M**	L	L	NA
70	6(isol)	**M**	**H**	L	LM	NA		**M**	NA	L	NA

M + MH = 80 **H = 33**

ALTERNATIVE #5
EXISTING ALIGNMENT WITH A JENKINS BYPASS

Wetland #	County	Sect.-Twp.-Range	Watershed	Type C-39	Type Cowardin	Dominant Vegetation	Wetland Size	Acreage of Impact	% Impacted	Topo Setting	In Shoreland Wetland Protection Zone or Floodplain of a Watercourse (give distance in feet)
1	Crow Wing	11-135-29	12 CW R.	6	PSS1C	sp.alder,sedge	45.00	3.52	8%	FP	adj. To Cullen Br.
Edna Lake	Crow Wing	2-135-29	12 CW R.		L1UBH		153.00	0.05	0%	ISO	**Edna Lake**
2	Crow Wing	2-135-29	12 CW R.	7	PSS4B	tamarack, b spruce	9.30	0.20	2%	ISO	500' to L Cullen, 700' to W Twin
2A	Crow Wing	2-135-29	12 CW R.	6	PSS1C	sp alder	2.00	0.63	32%	ISO	500' to L Cullen, 700' to W Twin
2B	Crow Wing	2-135-29	12 CW R.	4	PUBG		2.00	1.21	60%	ISO	500' to L Cullen, 700' to W Twin
4	Crow Wing	3-135-29	12 CW R.	6	PSS1C	willow	0.90	0.07	8%	ISO	600" to W Twin
6	Crow Wing	35-136-29	12 CW R.	3	PEMC	typha	0.30	0.04	13%	FP	May be lakebed, WTL
W Twin Lk	Crow Wing	35-136-29	12 CW R.		L1UBH		117.00	0.22	0%	ISO	**West Twin Lake**
7	Crow Wing	35-136-29	12 CW R.	7	PFO1B		0.30	0.01	2%	FP	may be lakebed,WTL
9	Crow Wing	26-136-29	12 CW R.	2	PEMB	sedge	0.72	0.72	100%	ISO	500' to W Twin L.
10	Crow Wing	26-136-29	12 CW R.	2	PEMB	sedge	0.05	0.05	100%	ISO	
11	Crow Wing	27-136-29	12 CW R.	2	PEMB	sedge	0.30	0.00	0%	ISO	
14	Crow Wing	26-136-29	12 CW R.	2	PEMB	sedge	0.24	0.03	12%	ISO	
15	Crow Wing	27-136-29	12 CW R.	6	PSS1B		14.30	0.77	5%	ISO	
18	Crow Wing	26-136-29	12 CW R.	6	PSS1C		0.54	0.33	61%	ISO	
20	Crow Wing	10-136-29	12 CW R.	1	PEMA		0.40	0.10	25%	ISO	200' to Sibley L.
21	Crow Wing	10-136-29	12 CW R.	6	PSS1C		19.00	0.81	4%	FP	may be lakebed, Sibley
24	Crow Wing	10-136-29	11 Pine R.	3	PEMC	typha	0.30	0.11	37%	ISO	
25	Crow Wing	3-136-29	11 Pine R.	3	PEMC		2.20	0.22	10%	ISO	
26	Crow Wing	3-136-29	11 Pine R.	3	PEMC		0.35	0.03	9%	ISO	
27	Crow Wing	3-136-29	11 Pine R.	3	PEMC		1.08	0.09	8%	ISO	
28	Crow Wing	3-136-29	11 Pine R.	2	PEMB		0.10	0.01	10%	ISO	
29	Crow Wing	3-136-29	11 Pine R.	3	PEMF		0.80	0.02	2%	ISO	
30	Crow Wing	34-137-29	11 Pine R.	3	PEMC		0.50	0.15	30%	ISO	
31	Crow Wing	3-136-29	11 Pine R.	8	PSS3B		10.90	0.02	0%	ISO	
32	Crow Wing	34-137-29	11 Pine R.	3	PEMC		54.00	6.28	12%	ISO	
34	Crow Wing	34-137-29	11 Pine R.	6	PSS1C		92.00	3.01	3%	TRIB	
36	Crow Wing	27-137-29	11 Pine R.	6	PSS1C		9.50	0.66	7%	FT	
Hay Creek	Crow Wing	27-137-29	11 Pine R.		R2UBH		340'	channel	realign	R	**Hay Creek**
40	Crow Wing	27-137-29	11 Pine R.	2	PEMB		0.20	0.06	30%	ISO	50' to Hay Cr.
41	Crow Wing	22,27-137	11 Pine R.	3	PEMC		7.50	0.05	1%	ISO	
44	Cass	21-137-29	11 Pine R.	2	PEMB		0.20	0.12	60%	ISO	
46	Cass	21-137-29	11 Pine R.	3	PUBGx		3.40	0.75	22%	ISO	
48	Cass	21-137-29	11 Pine R.	3	PEMC		0.20	0.17	85%	ISO	
50	Cass	21-137-29	11 Pine R.	2	PEMB		0.05	0.04	80%	ISO	
52	Cass	16-137-29	11 Pine R.	6	PSS1C		230.00	4.92	2%	ISO	
53	Cass	16-137-29	11 Pine R.	6	PSS1C		0.80	0.80	100%	ISO	
54	Cass	16-137-29	11 Pine R.	6	PSS1C		1.20	0.03	2%	ISO	
56	Cass	16-137-29	11 Pine R.	6	PSS1C		1.62	1.62	100%	TRIB	
59	Cass	8-137-29	11 Pine R.	6	PSS1B		0.15	0.09	60%	FP	160' to Pine R.
62	Cass	8-137-29	11 Pine R.	6	PSS1C		2.00	0.25	12%	FP	adj to Pine R
Pine River	Cass	8-137-29	11 Pine R.		R2			0.00	0%	R	**Pine R.**
64	Cass	5-137-29	11 Pine R.	7	PFO1C		0.25	0.03	12%	ISO	
65	Cass	6-137-29	11 Pine R.	6	PSS1B		0.80	0.03	4%	ISO	
67	Cass	6-137-29	11 Pine R.	2	PEMB		0.35	0.35	100%	FP	adj to Norway Br.
68	Cass	6-137-29	11 Pine R.	6	PSS1C		0.09	0.00	0%	FP	adj to Norway Br.
69	Cass	6-137-29	11 Pine R.	2	PEMB		0.35	0.35	100%	FP	adj to Norway Br.
70	Cass	6-137-29	11 Pine R.	6	PSS1C		0.20	0.05	25%	FP	adj to Norway Br.
							Total	**29.07**			

	ISO	TRIB	FT	RIV	FP	TOTAL
Type						
1	0.1					0.1
2	1.03				0.7	1.73
3	7.87				0.04	7.91
4	1.21					1.21
5						
6	7.58	4.63	0.66		4.72	17.59
7	0.23				0.01	0.24
8	0.02					0.02
LAKE	0.27					0.27
TOTAL						29.07

HIGHWAY 371 NORTH IMPROVEMENT PROJECT

SCALE: 1" = 800'

800 0 800

scale feet

12/17/2003

L E G E N D

EXISTING ROADWAY

WETLAND BOUNDARY

Functions and Values Assessment
CR 18 to CR 29/107

HIGHWAY 371 NORTH IMPROVEMENT PROJECT

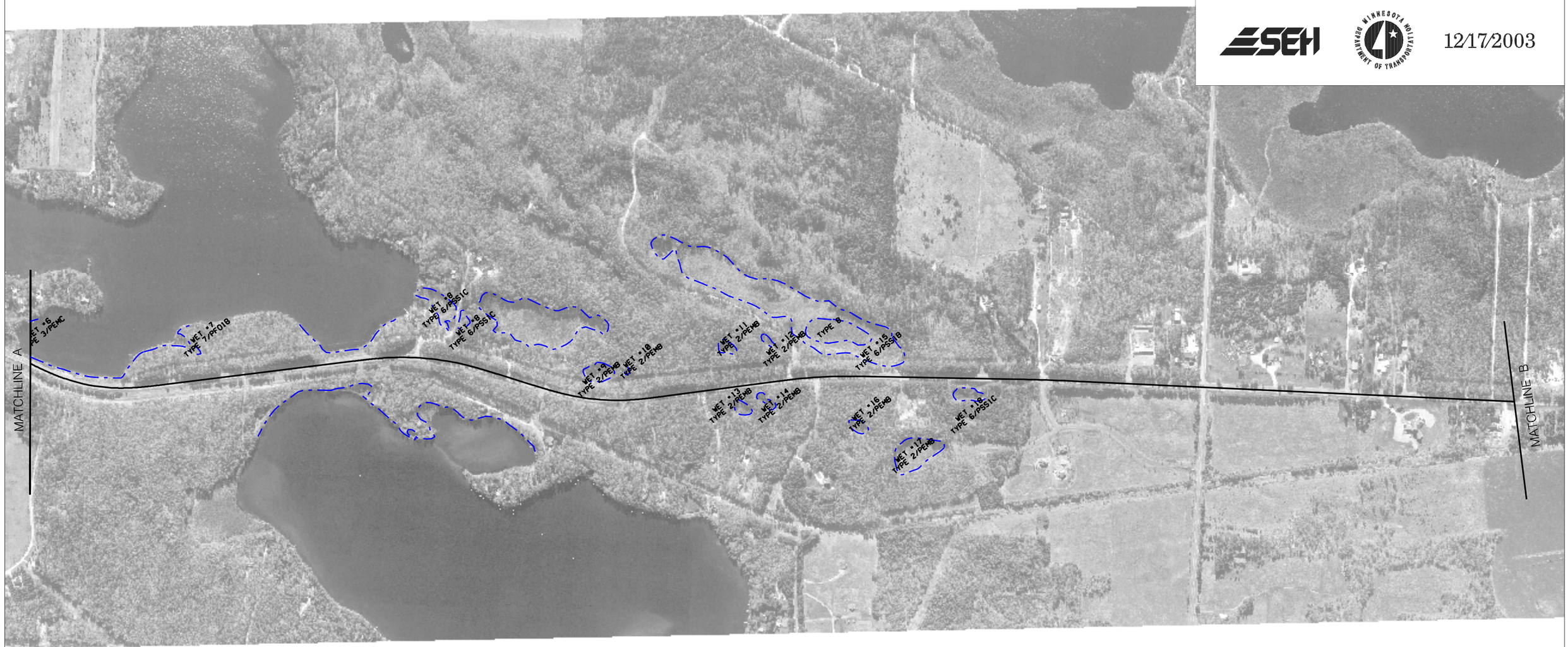
PRELIMINARY LAYOUT
SUBJECT TO CHANGE

SCALE: 1" = 800'

800 0 800

scale feet

12/17/2003



LEGEND

EXISTING ROADWAY

WETLAND BOUNDARY

Functions and Values Assessment
West Twin Lake to North of CR 107/168

HIGHWAY 371 NORTH IMPROVEMENT PROJECT

PRELIMINARY LAYOUT
SUBJECT TO CHANGE

SCALE: 1" = 800'

800 0 800

scale feet

12/17/2003

L E G E N D

EXISTING ROADWAY

WETLAND BOUNDARY

Functions and Values Assessment
North of CR 107/168 to CR 17

HIGHWAY 371 NORTH IMPROVEMENT PROJECT

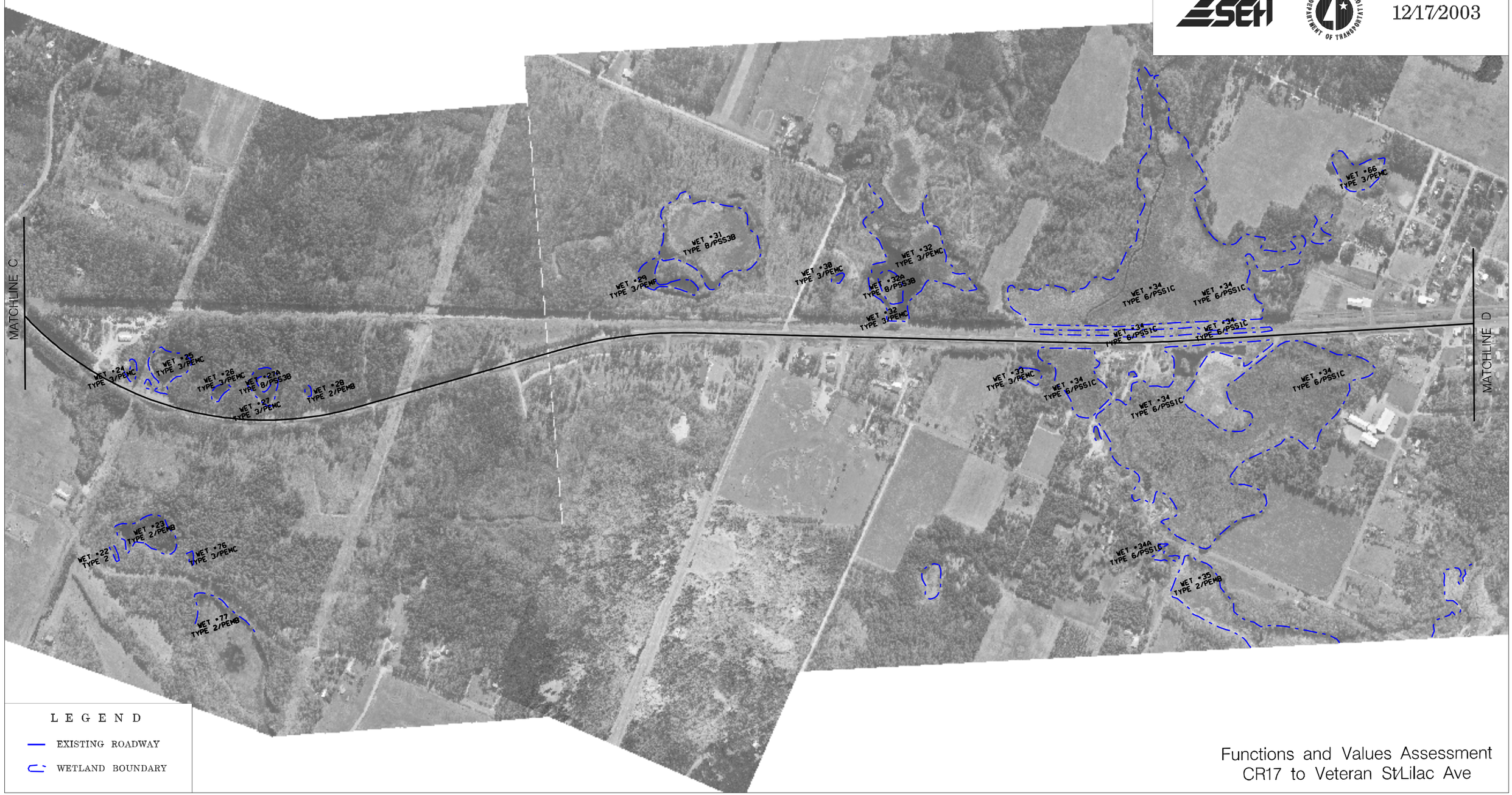
SCALE: 1" = 800'

800 0 800

scale feet

12/17/2003

PRELIMINARY LAYOUT
SUBJECT TO CHANGE



L E G E N D

EXISTING ROADWAY

WETLAND BOUNDARY

Functions and Values Assessment
CR17 to Veteran St/Lilac Ave

HIGHWAY 371 NORTH IMPROVEMENT PROJECT

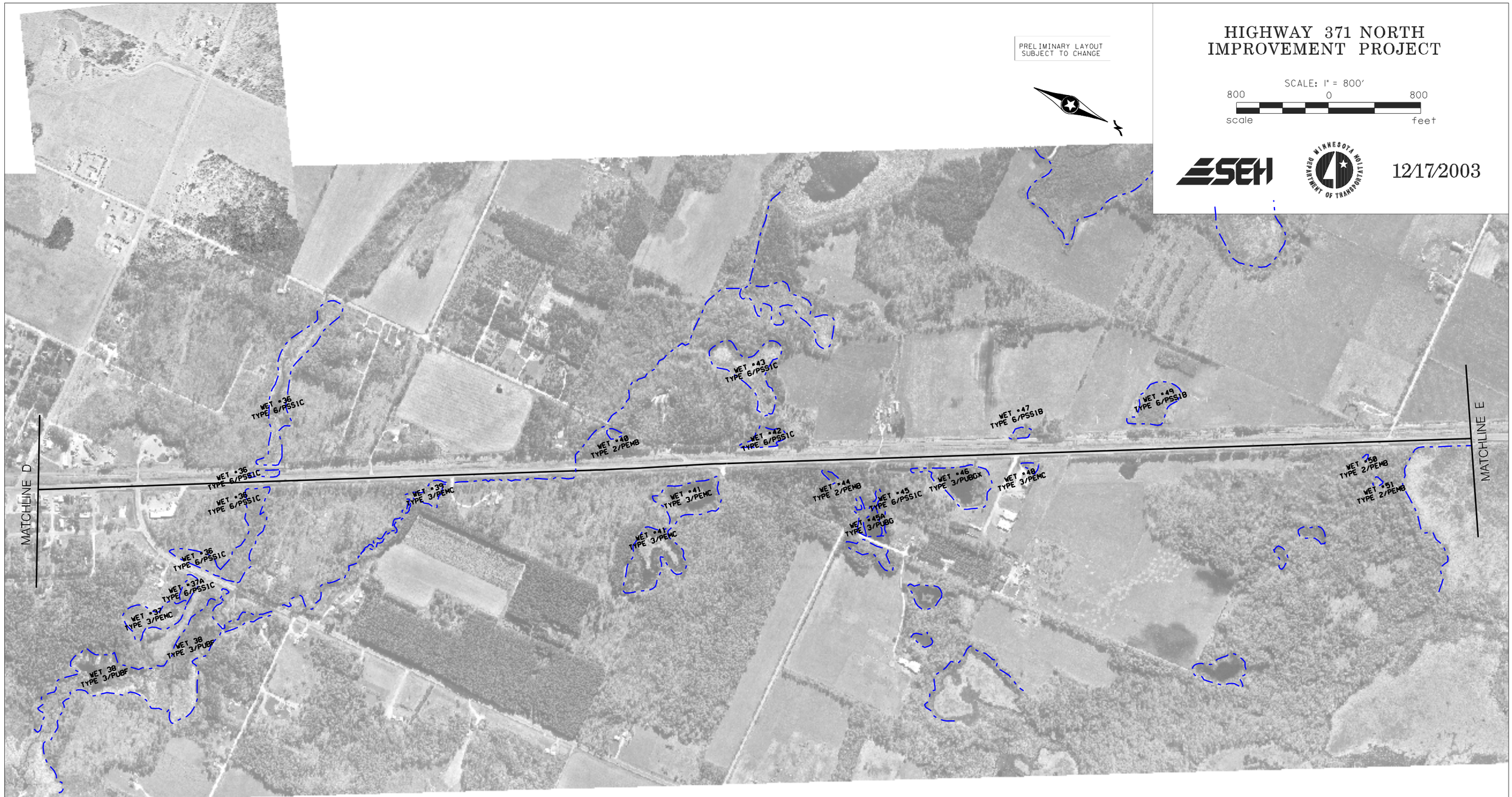
SCALE: 1" = 800'

800 0 800

scale feet

12/17/2003

PRELIMINARY LAYOUT SUBJECT TO CHANGE



L E G E N D

EXISTING ROADWAY

WETLAND BOUNDARY

Functions and Values Assessment
Veteran St/Lilac Ave to 36th St.

HIGHWAY 371 NORTH IMPROVEMENT PROJECT

SCALE: 1" = 800'

800 0 800

scale feet

SEH

MINNESOTA DEPARTMENT OF TRANSPORTATION

12/17/2003

L E G E N D

EXISTING ROADWAY

WETLAND BOUNDARY

Functions and Values Assessment
36th St. to North of CR 44

HIGHWAY 371 NORTH IMPROVEMENT PROJECT

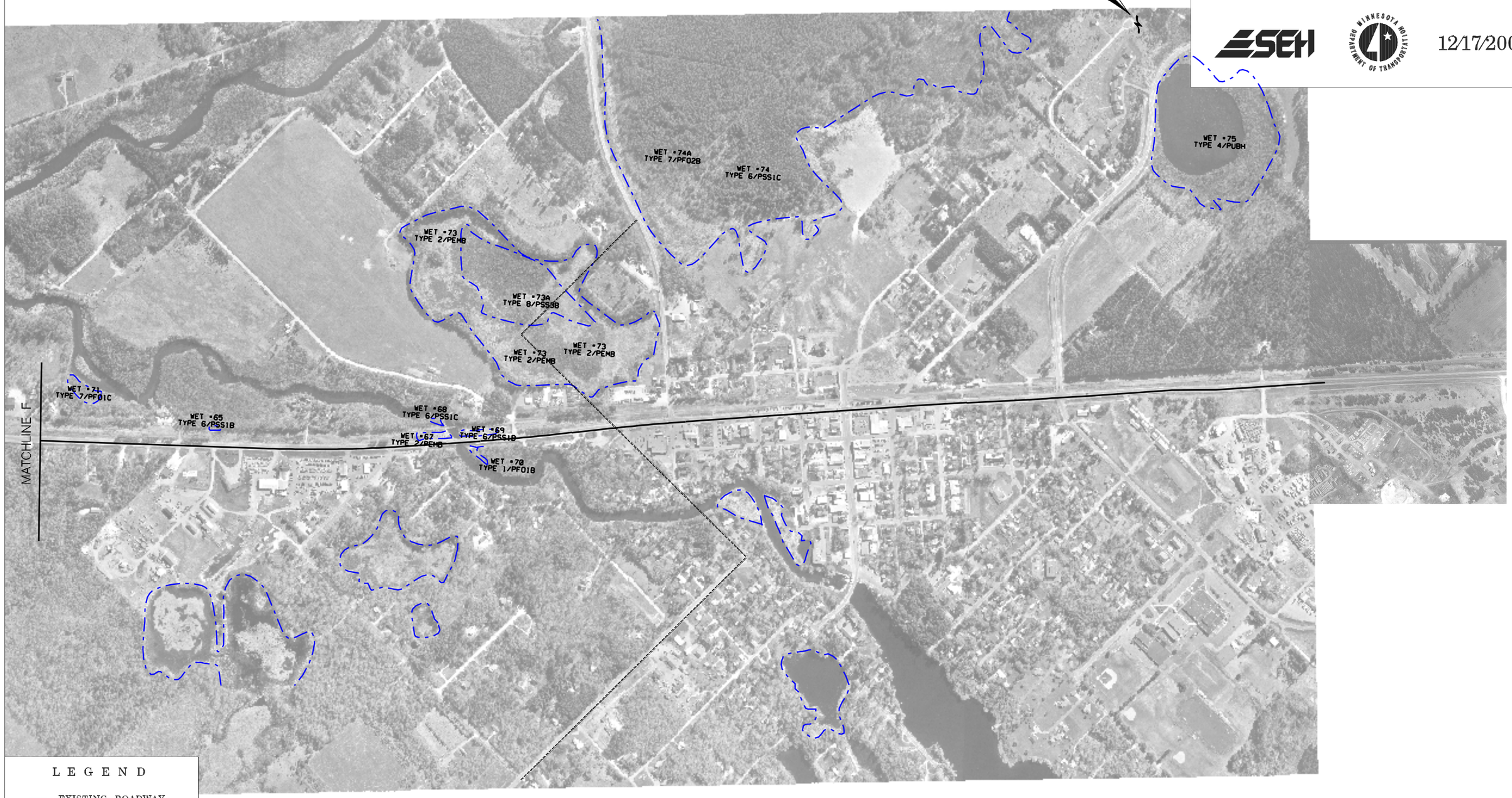
SCALE: 1" = 800'

800 0 800

scale feet

12/17/2003

PRELIMINARY LAYOUT SUBJECT TO CHANGE



LEGEND

EXISTING ROADWAY

WETLAND BOUNDARY

Functions and Values Assessment
Pine River