APPENDIX B

SUMMARY OF STUDY AND ANALYSES TO DETERMINE EXTENT OF INUNDATION

These #s are from 1929 Datum.

APPENDIX B

SUMMARY OF STUDY AND ANALYSIS TO DETERMINE THE EXTENT OF INUNDATION

A. Data and Assumptions

Effects of the failure of Tri Creek Structure No. 1 were analyzed utilizing the National Weather Service (NWS) Dam Break Flood Forecasting Computer Model, DAMBRK. The NWS 1988 DAMBRK version was used in this analysis.

Input parameters used in this analysis were developed based on available data from the following sources:

1. National Dam Safety Inspection Report for the Tri Creek Structure No. 1.

2. U.S. Geological Survey 7-1/2 minute topographic maps; St. Mary's WI, Wilton WI, Tomah WI, and City Rock WI.

3. HEC-2 data as furnished by both the DNR and the U.S. Army Corps of Engineers for water surface profile modeling developed for Moore Creek at Norwalk WI.

4. Field inspection and survey by Ayres Associates (1989).

The reach modeled starts on the tributary to Moore Creek at the Tri Creek Structure No. 1 and extends down Moore Creek to the Kickapoo River. The analysis was terminated at the Kickapoo River per discussion with the DNR on November 30, 1989. To model the effects of this dam breach the reach was broken into two models. The upper reach model used the DAMBRK option 1 while the lower reach model used option 7. The two reaches were necessary due to the propagation of interpolated cross sections based on the reach lengths recommended by the DAMBRK model during preliminary analysis.

The 100-year discharge of 1,810 cubic feet per second was used for this analysis. This discharge is based on a comparison of the 1988 DNR recommended values, the Dam Safety Inspection Report, the USGS gage records at the dam site prior to construction of the dam, and Congers 1981 equations. Based on comparisons and NR116 recommended procedures the USGS gage analysis results were used. The discharge-frequency relationship at the dam is shown in Table B-1. The inflow hydrograph was developed using the Soil Conservation Service unit hydrograph method.

TABLE B-1
Discharge - Frequency Relationships
at Tri Creek Structure No. 1

Recurrence Interval (Years)	Exceedance Probability (Percent)	Peak Discharge (CFS)
10	10	1,030
50	2	1,580
100	1	1,810
500	0.2	2,360

Input parameters for the Tri Creek Structure No. 1 analysis were based on available information and verified by field measurements.

Dam breach parameters were based on the DNR NR333 Code and the Federal Energy Regulatory Commission (FERC) Guidelines, Appendix IIA, Table 1. The structure is an earthen embankment dam that is assumed to fail due to piping through the embankment at the maximum water surface elevation for the 100-year flood event. The dam breach parameters selected for use in this modeling analysis are listed in Table B-2.

TABLE B-2
Dam Breach Parameters

Failure Time (hr.)	1.0
Bottom of Breach Width (ft.)	90
Breach Sideslope (1 Vertical to)	0 Horizontal
Initial Center of Breach Elevation (MSL)	1100.0
Bottom of Breach Elevation (MSL)	1095
Reservoir Failure Elevation (MSL)	1112.1
Initial Reservoir Elevation When 100-year Flow Commences (MSL)	1107.0

Cross-section information in the Village of Norwalk was obtained from available HEC-2 data. The cross-section data for the rest of the model was based on the available 7-1/2 minute maps. Channel information for the non HEC-2 data was approximated. Cross-section mileage for the DAMBRK model starts at the upstream face of the Tri Creek Structure No. 1. Mileage was scaled off of the 7-1/2 minute topographic maps except for the Village of Norwalk where the 1"=100' scale HEC-2 cross-section location maps were used.

B. Inundation Results

Table B-3 summarizes the peak of the flood-wave from the dam breach analysis and provides a comparison with the non-breach condition. Also included is the profile generated by the DAMBRK model assuming the dam is removed. The travel times shown indicate that this failure wave travels approximately 2-miles per hour. It should be noted that the breach begins to form approximately one-half hour before the maximum discharge occurs through the breach.

The results of this analysis shows that the failure of Tri Creek Structure No. 1 will have a very significant impact. The hydraulic shadow produced by this investigation is shown in Appendix C.

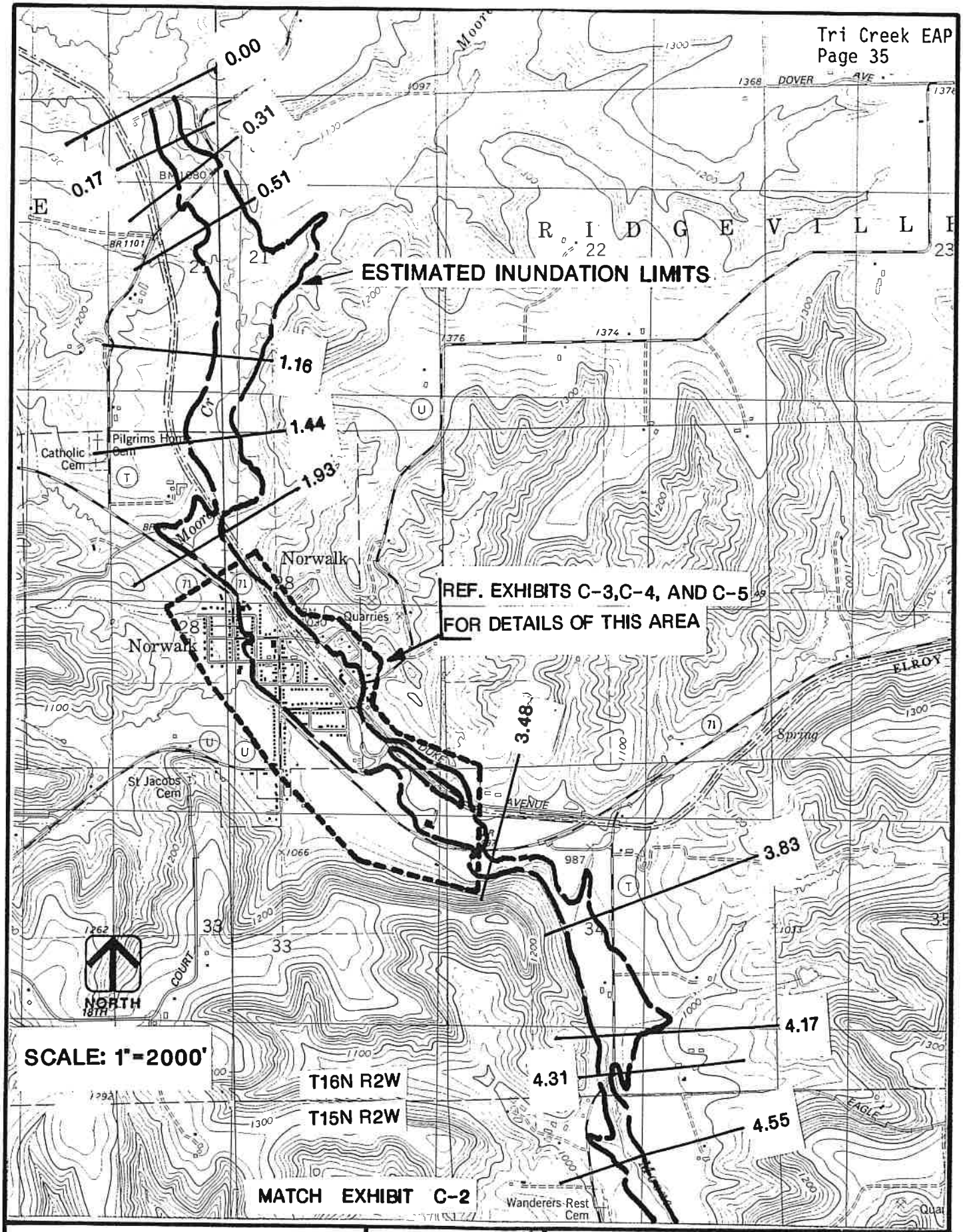
As of March 1991 all backup computations for this analysis are on file at the Eau Claire office of Ayres Associates. This includes input and output computer listings of the DAMBRK model, reservoir elevation-area-capacity data, the 100-year inflow hydrograph, cross-section plots, and floppy disks containing the DAMBRK input and output files.

TABLE B-3
Flood Wave Summary and Comparison

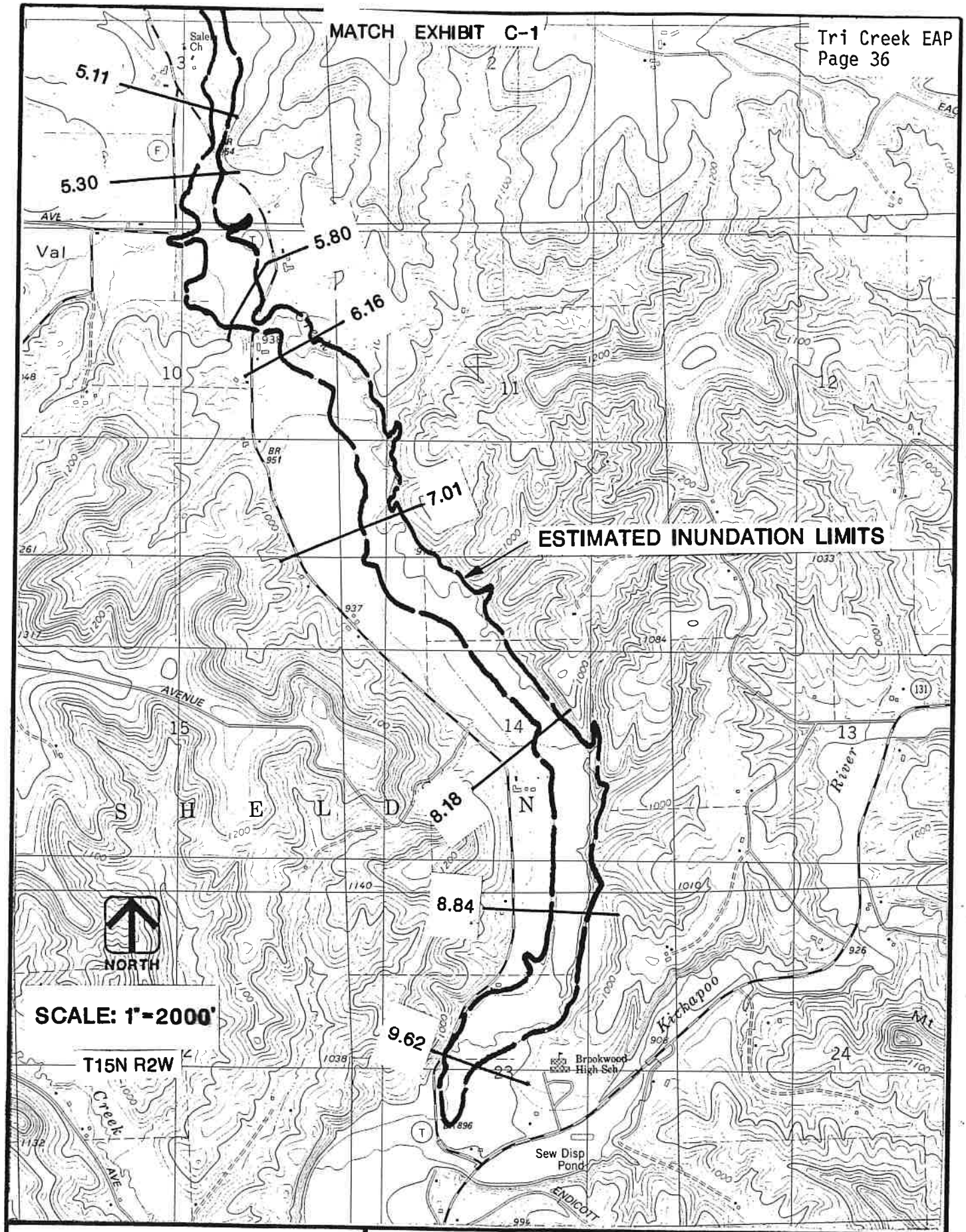
Dambrk Cross Section (River Mile)	HEC-2 Cross-Section	Maximum Water Surface Elevation			Breached Flood Wave Travel Time	Comments
		Without Breach	With Breach	No Dam	Hours	
0.0		1082.44	1091.65	1086.54	0.0	Dam
0.17		1078.37	1087.76	1083.45	0.05	
0.31		1073.48	1081.92	1078.48	0.1	
0.338		1073.13	1081.20	1077.18	0.1	
0.51		1067.88	1074.80	1072.42	0.2	
1.16		1049.65	1052.24	1050.29	0.4	
1.44		1043.50	1045.78	1043.98	0.6	
1.789		1033.61	1036.69	1034.27	0.8	
1.808		1033.03	1035.16	1033.54	0.8	Bike Trail
1.93		1029.15	1031.16	1029.60	1.0	
2.06	MCX29	1027.78	1030.02	1028.19	1.0	Average Val
2.14	MCX28	1026.51	1029.51	1027.41	1.1	
2.21	MCX27	1024.00	1028.17	1026.13	1.1	
2.30	MCX26	1021.30	1025.78	1023.59	1.2	
2.356	MCS5.1	1020.00	1024.19	1022.33	1.2	Railroad St
2.38	MCX25	1019.57	1023.39	1021.78	1.2	
2.45	MCX24	1017.56	1021.38	1018.59	1.3	
2.55	MCX23	1014.08	1019.01	1014.71	1.4	
2.63	MCX22	1012.28	1016.41	1012.92	1.4	
2.658	MCS4.1	1011.89	1014.77	1012.50	1.5	CTH U
2.70	MCX21	1011.35	1012.69	1011.74	1.5	
2.76	MCX20	1007.48	1008.48	1007.62	1.5	
2.89	MCX19/133	1004.78	1005.96	1004.99	1.6	Bike Trail
2.94	MCX18/132	1003.09	1004.44	1003.35	1.6	
3.07	MCX17/131	999.53	1000.98	999.80	1.7	
3.17	MCX16/130	998.01	999.48	998.28	1.8	
3.27	MCX14	995.86	996.95	996.06	1.8	
3.36	MCX13	990.91	992.34	991.15	1.8	
3.396	MCS1.1	989.18	990.46	989.41	1.9	STH 71
3.44	MCX12	988.35	989.49	988.55	1.9	
3.48		986.04	987.59	986.32	1.9	
3.83		976.45	977.76	976.69	2.0	
4.17		969.68	972.50	970.32	2.4	
4.31		968.77	971.30	969.44	2.4	CTH T
4.55		963.17	964.13	963.42	2.5	
5.11		947.84	948.94	948.14	2.8	
5.30		942.60	943.80	942.94	2.8	CTH T
5.80		934.74	936.33	935.16	3.2	
5.86		933.37	934.96	933.85	3.2	CTH T
6.16		928.98	930.06	929.32	3.3	
7.01		920.10	921.02	920.40	3.8	
8.18		907.62	908.73	908.01	4.5	
8.84		901.76	902.54	902.05	4.9	
9.62		892.84	894.10	893.26	5.5	
9.79		888.63	890.96	889.35	5.6	CTH T

APPENDIX C
INUNDATION MAP

Exhibit Nos. C-1 through C-5 shows the approximate area within Monroe County inundated by the failure of Tri Creek Structure No. 1 during the 100-year flood. Because of the method, procedures, and assumptions used to develop the flooded areas, the limits of flooding shown and flood wave travel times are approximate and should be used only as a guideline for establishing evacuation zones. Actual areas inundated will depend on actual failure conditions at Tri Creek Structure No. 1 and may differ from areas shown on the map.



TRI CREEK STRUCTURE NO.1	Drn. By: J.SCHMIDT 95 Chk. By: J. SMIT 95 Date: 12/89 AYRES ASSOCIATES	INUNDATION MAP D/S OF TRI CREEK DAM	EXHIBIT C-1



TRI CREEK STRUCTURE NO.1	Drn. By: J.SCHMIDT Chk. By: J. SMIT Date: 12/89 AYRES ASSOCIATES	INUNDATION MAP D/S OF TRI CREEK DAM	EXHIBIT C-2

REF. EXHIBIT C-1 FOR CONTINUATION

2.06

2.14

2.21

2.30

2.356

2.38

2.45

ESTIMATED INUNDATION LIMITS

MATCH EXHIBIT C-2

NORTH

SCALE-1"=200'

T16N R2W

INUNDATION MAP
D/S OF TRI CREEK DAM

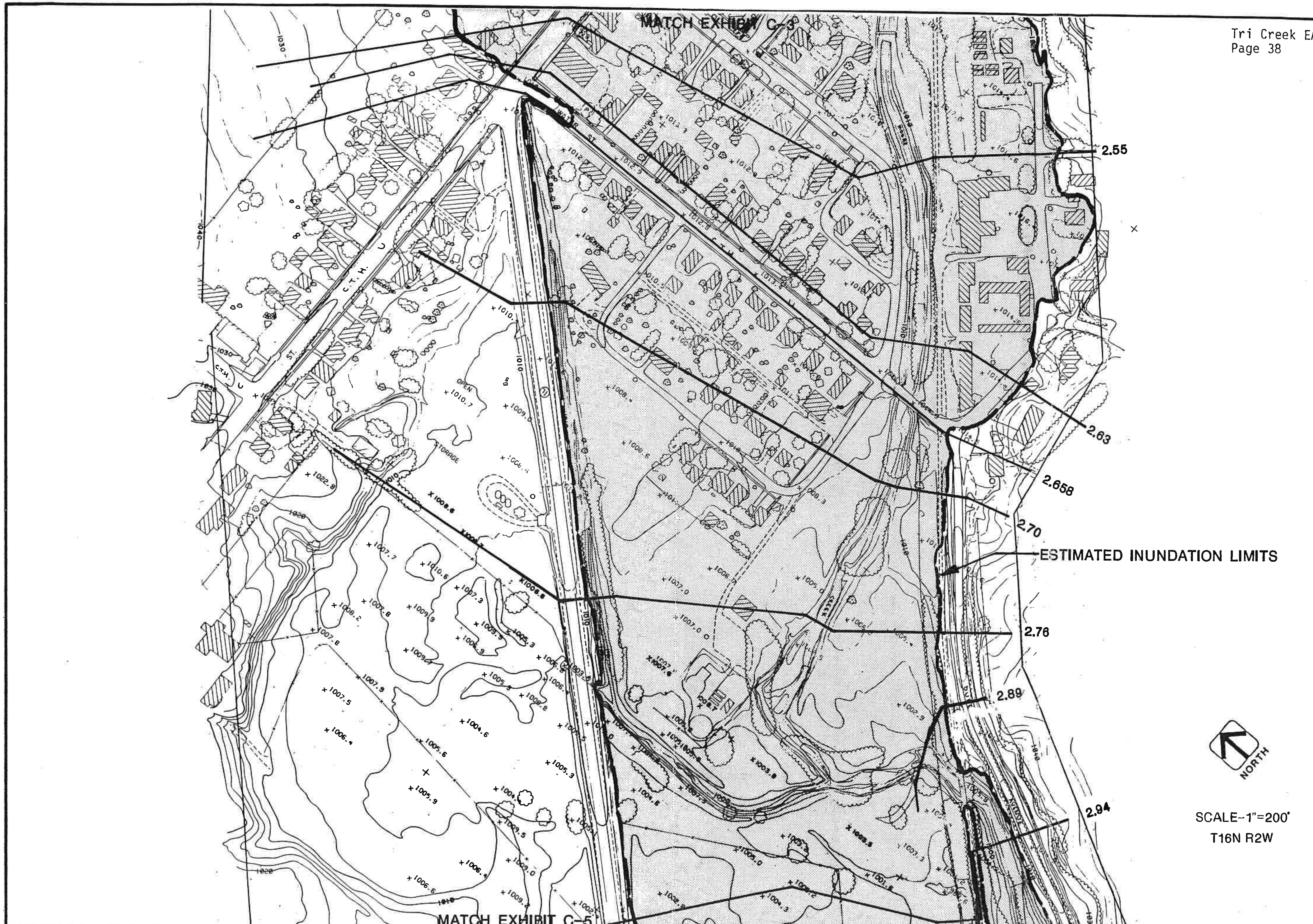
Drn. By: J.SCHMIDT
Chk. By: J. SMIT
Date: 12/89

AYRES ASSOCIATES

TRI CREEK
STRUCTURE NO.1

EXHIBIT

C-3



INUNDATION MAP
D/S OF TRI CREEK DAM

Drn. By: J. SCHMIDT
Chk. By: J. SMIT
Date: 12/89

AYRES ASSOCIATES

TRI CREEK
STRUCTURE NO.1

EXHIBIT
C-4

MATCH EXHIBIT C-4

ESTIMATED INUNDATION LIMITS

3.07

3.17

3.36

3.396

3.44

3.27

NORTH

SCALE-1"=200'

T16N R2W

REF. EXHIBIT C-1 FOR CONTINUATION

INUNDATION MAP
D/S OF TRI CREEK DAM

Drn. By: J.SCHMIDT
Chk. By: J.SMIT
Date: 12/89

AYRES ASSOCIATES

TRI CREEK
STRUCTURE NO.1

EXHIBIT
C-5