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APPENDIX A—FEE SCHEDULE

RESOLUTION OF THE SALEM TOWN BOARD:

RESOLUTION TO ADOPT 2012
TOWNSHIP COOPERATIVE PLANNING FEE SCHEDULE

RESOLUTION 2012-11

WHEREAS, Salem Township is a member of the Township Cooperative Planning Association,
and;

WHEREAS, the Board of the Township Cooperative Planning Association approves a fee
structure for development within each member Town, and;

WHEREAS, as members of said organization, each member should adopt the same fee
schedule.

NOW THEREFORE BE IT RESOLVED, Salem Township hereby adopts the 2012 Township
Cooperative Planning fee schedule.

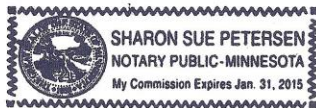
Motion made by Rick Lutzi

Second by: Jim Evans

Passed this first day of February, 2012 with 2 yes votes and 1 no votes.


Chairman

Attest:




Clerk

TCPA - FLAT FEES - 1/1/2012

Connect Water/Sewer Line-----	\$ 85.00
Install New Fireplace/ Wood Stove-----	\$ 85.00
Replacement of Fireplace Gas Insert-----	\$ 85.00
Replace Furnace-----	\$ 85.00
Install Air Conditioner-----	\$ 85.00
Install Water Heater-----	\$ 85.00
Install Gas Pipe Line-----	\$ 85.00
Replace Roof Top (HVAC) -----	\$ 135.00
Re-Roof-----	\$ 85.00
Re-Side-----	\$ 85.00
Install MFG Home-----	\$ 200.00
Plumbing Permit-----	\$ 31.00
Mechanical Permit-----	\$ 31.00
Re-Activation of expired Permit-----	\$ 85.00
Door/Window Replacement-----	\$85.00 (not include egress windows)
Re-Inspection -----	\$90.00
GIS residential Address-----	\$ 112.00

* All fees include State Surcharge's as required.

Note:

Retaining Wall if over 4 feet in height from bottom of footing to top of the wall requires building permit.

APPLICATION			1/1/2012			APPROVED	COUNTY FEE 2011
AGRICULTURAL SETBACK PERMIT						\$49	
Mobile Home Installation			Flat Fee for Zoning			\$49	
Moving Permit						\$102	
Grading/Erosion Permit						\$214	
Demolition Permit						\$51	
Compliance Letter		Single Family-Other				\$102	
Home Occupation (Staff Approved)						\$197	
Temporary Use						\$1,500	
WETLAND PERMITS							
EXCEPTION DETERMINATION						\$281	
NO-LOSS DETERMINATION						\$281	
DEVELOPMENT APPLICATION FEES							
LAND USE AMENDMENT							
LESS THAN 1 ACRE						\$1,969	
1-10 ACRES + PER ACRE						\$1,969+\$56	
11-99 ACRES + PER ACRE						\$2,529+\$18	
100+ ACRES +PER ACRE						\$4,131+1	
RESIDENTIAL ZONING CHANGE							
LESS THAN 1 ACRE						\$1,238	
1-10 ACRES + PER ACRE						\$1,238 +\$16	
11-99 ACRES + PER ACRE						\$1,398 +5	
100+ ACRES +PER ACRE						\$1,843+1	
NON RESIDENTIAL ZONING							
LESS THAN 1 ACRE						\$1,631	
1-10 ACRES + PER ACRE						\$1,631+70	
11-99 ACRES + PER ACRE						\$2,331+\$15	
100+ ACRES +PER ACRE						\$3,666+\$1	
AGRICULTURAL ZONING							
LESS THAN 10 ACRES						\$1,238	
10-99 ACRES						\$1,100 +\$5	
100+ ACRES + PER ACRE						\$1,550 + \$1	
TEXT AMENDMENT						\$1,238	
GENERAL DEVELOPMENT PLAN						\$1,514	
ARC AMENDMENT						\$855	
CONDITIONAL USE PERMITS							
HOME OCCUPATION + ENV FEE						\$563	

AGRICULTURAL USE + ENV FEE					\$529	
RESIDENTIAL USE + ENV FEE					\$563	
NON-RESIDENTIAL USE + ENV FEE					\$1,376	
VARIANCE						
RESIDENTIAL USE+ENV FEE					\$529	
RESIDENTIAL USE WITH (LOTS) + ENV FEE			PER LOT		\$529	\$168 ADD LOTS
NON-RESIDENTIAL USE + ENV FEE					\$1,058	
APPEALS					\$264	
TRAFFIC IMPACT REPORT			ANALYSIS (OVER 2 HRS)		\$18-\$89	
TRAFFIC DESIGN ANALYSIS PER REPORT					\$89	
PLATS						
PRELIMINARY & RESUBDIVISIONS					\$1,238 + 23	
FINAL PLAT					\$956 + \$23	
SUBDIVISION VARIANCES					\$529	
METES AND BOUNDS + ENV FEE					\$742	
THOROUGHFARE PLAN AMEND					\$1,058	
ENVIRONMENTAL WORKSHEET						
LESS THAN 1 ACRE					\$1,969	
1-10 ACRES					\$1,969 + 84	
11-99 ACRES + PER ACRE					\$2,809+18	
100+ ACRES + PER ACRE					\$4,411 + 1	
ENVIRONMENTAL IMPACT STATEMENT					TO BE DONE CASE BY CASE	
MOBILE HOME PARK						
1-10 HOMES					\$1,631	
11-99 HOMES					\$1,450 + 20	
100+ HOMES					\$3,250 + 5	
MOBILE HOME PARK AMENDMENT					\$1,040	
MOBILE HOME INSTALLATION INSPECTION						
PIER FOOTINGS						
RE-INSPECTION			PER INSPECTION		\$90	

DOCUMENT RESEARCH						
INVESTIGATION AND NOTICE OF IMPROPER DISPOSAL			PER HOUR PER PERSON			
ENVIRONMENTAL FEE						\$86
ISTS						
INDIVIDUAL RESIDENTIAL HOME						\$500
COMMUNITY RESIDENTIAL HOME						\$315
UP TO 1,000						\$500
1,000 TO 5,000						\$1,485
5,000 AND UP						\$1,969
SEWAGE OR HOLDING TANK						\$371
ALTER OR REPLACE TANK						\$371
ALTER EXISTING DRAINFIELD						\$371
DRAINFIELD REPLACEMENT						\$500
PLATS –BASIC +PER LOT			INCLUDING WELLS			\$550+\$160
COMPLIANCE LETTER						\$102
INVESTIGATION AND NOTICE OF IMPROPER DISPOSAL						\$75 PER HR
ADDITIONAL COPIES OF PERMIT						\$30
GIS IMPACT FEE		RECORDED PLATS PLUS PER LOT				
GIS METES AND BOUNDS						\$76 PER APPLICATION
E 911 ADDRESS NEW						\$112
E 911 ADDRESS CHANGE						
CMS						
CERTIFIED BUILDING OFFICIAL						\$52.25
BUILDING FIELD INSPECTOR						\$48.75
BUILDING OFFICIAL CONSULTANT						\$52.25
CLERICAL/SECRETARIAL						\$32.25
MILEAGE						LEGAL RATE
OTHER EXPENSES						AT COST
NON-SUFFICIENT CHECKS						\$25.00
RE-INSPECTION						\$90.00

**APPENDIX B
CROP EQUIVALENT RATING FOR SOILS IN OLMSTED COUNTY**

**Numerical List of Correlated Names
5/19/81**

Symbol	Approved Name	CER RATING
2A	Ostrander silt loam, 0-2% slopes	95
2B	Ostrander loam, 2-6% slopes	85
11C	Sogn loam, 4-12% slopes	25
16	Arenzville silt LOAM	80
19	Chaseburg silt loam	45
23	Skyberg silt loam	75
24	Kasson silt loam	85
25	Becker loam	55
27A	Dickinson sandy loam, 0-1% slopes	65
27B	Dickinson sandy loam, 2.6% slopes	55
27C	Dickinson sandy loam, 6-12% slopes	55
30B	Kenyon loam, 1-6% slopes	85
42E	Saliday gravelly sandy loam, 12-35% slopes	15
73F	Bellechester loamy sand, 25-45% slopes	30
99B	Racine silt loam, 1-6% slopes	85
99C	Racine silt loam, 6-12% slopes	65
99D2	Racine loam, 12-18% slopes, eroded	45
131B	Massbach silt loam, 2-6% slopes	80
131C	Massbach silt loam, 6-12% slopes	70
131D	Massbach silt loam, 12-18% slopes	55
1438	Eleva sandy loam, 2-6% slopes	50
143C	Eleva sandy loam, 6-12% slopes	45
173F	Frontenac loam, 15-35% slopes	20
176	Garwin silty clay loam	60
176dr.	Garwin silt clay loam	90
203	Joy silt loam, 1-4% slopes	85
209A	Kegonsa silt loam, slopes greater than 4%, 0-2% slopes	65
209B	Kegonsa silt loam, 2-6% slopes	60
216B	Lamont sandy loam, 2-6% slopes	55
244C	Lilah sandy loam, 6-12% slopes	20
251F	Marlean silt clay loam, 25-40% slopes	15
251G	Marlean silty clay loam, 40-80% slopes	15
252	Marshan silt loam	60
252dr.	Marshan silt loam	85
283B	Plainfield loamy sand, 0-6% slopes	25
283C	Plainfield sand, 6-12% slopes	15
283E	Plainfield sand, 12-30% slopes	10
285A	Port Byron, silt loam, 0-1% slopes	100
285B	Port Byron, silt loam, 1-2% slopes	95

Symbol	Approved Name	CER RATING
285C	Port Byron, silt loam, 5-9% slopes	85
289	Radford silt loam	70
295	Readlyn loam	85
298	Richwood silt loam, 1-2% slopes	100
299A	Rockton loam, 0-1% slopes	85
299B	Rockton loam, 1-6% slopes	65
299C	Rockton loam, 6-12% slopes	55
301B	Lindstrom silt loam, 2-6% slopes	95
301C	Lindstrom silt loam, 6-15% slopes	75
309C	Schapville siltyclay loam, 6-12% slopes	45
309D	Schapville siltyclay loam, 12-25% slopes	40
312B	Shullsburg silt loam, 2-6% slopes	75
312C	Shullsburg silt loam, 6-12% slopes	60
313	Spillville silt loam	90
322C	Timula silt loam, 6-12% slopes	70
322D	Timula silt loam, 12-18% slopes	55
322E	Timula silt loam, 18-30% slopes	45
333	Vasa silt loam	90
340B	Whalan loam, 1-6% slopes	65
340C	Whalan loam, 6-12% slopes	55
369B	Waubeek silt loam, 1-6% slopes	95
369C	Waubeek silt loam, 6-12% slopes	75
378	Maxfield silty clay loam	60
378dr.	Maxfield silty clay loam	90
401B	Mt. Carroll silt loam, 2-6% slopes	90
401C	Mt. Carroll silt loam, 6-12% slopes	75
401C2	Mt. Carroll silt loam, 6-12% slopes, eroded	70
401D	Mt. Carroll silt loam, 12-18% slopes	60
401D2	Mt. Carroll silt loam, 12-18% slopes, eroded	55
401E	Mt. Carroll silt loam, 18-25% slopes	50
463	Minnieska loam, occasionally flooded	50
465	Kalmarville silt loam	40 (10 if very wet)
467	Sawmill silty clay loam	60
467dr.	Sawmill silty clay loam	90
468	Otter silt loam, channeled	40
471	Root silt loam	10
472B	Channahon loam, 1-6% slopes	40
472C	Channahon loam, 6-12% slopes	30
473D	Dorerton loam, 12-25% slopes	25
473F	Dorerton loam, 25-40% slopes	15
474B	Hayerhill siltyclay loam, 1-8% slopes	20
475B	Backbone sandy loam, 1-6% slopes	55
475C	Backbone sandy loam, 6-12% slopes	45
476B	Frankville silt loam, 1-6% slopes	70
476C	Frankville silt loam, 6-12% slopes	60
477A	Littleton silt loam, 0-1% slopes	100
477A	Littleton silt loam, 0-1% slopes	90 (flooded)
477B	Littleton silt loam, 1-4% slopes	85
478B	Coggon silt loam, 2-6% slopes	80
479	Floyd silt loam, 1-4% slopes	85
483A	Waukee loam, 0-2% slopes	80

Symbol	Approved Name	CER RATING
483B	Waukee loam, 2-6% slopes	75
484C	Eyota sandy loam 6-12% slopes	65
484E	Eyota loamy sand, 12-25% slopes	50
485	Lawler loam	85
486	Marshan silt loam, depressional	40
487	Hoopeston sandy loam	70
488F	Brodale flaggy loam, 24-40% slopes	10
488G	Brodale flaggy sandy loam, 40-80% slopes	10
489A	Atkinson loam, 0-1% slopes	90
489B	Atkinson loam, 1-6% slopes	85
491B	Waucoma loam, 2-6% slopes	85
492B	Nasset silt loam, 2-6% slopes	85
492C	Nasset silt loam, 6-12% slopes	65
493B	Oronoco loam, 2-6% slopes	85
493C	Oronoco loam, 6-12% slopes	65
493D	Oronoco loam, 6-12% slopes	55
495	Zumbro loamy sand	50
516A	Dowagiac loam, 0-2% slopes	60
516B	Dowagiac silt loam, 2-6% slopes	55
516C	Dowagiac sandy loam, 6-12% slopes	40
528B	Palms muck, 1-6% slopes	35
593D	Elbaville silt loam, 12-18% slopes	50
593E	Elbaville silt loam, 18-30% slopes	40
898F	Brodale-Bellechester complex, 25-60% slopes	10
973D	Brodale-Sogn complex, 12-25% slopes	20
1013	Pits, quarry	0
1029	Pits, gravel	0
1039	Urban land	0
1078	Udorthents	0
1811B	Lamont-Racine complex, 2-6% slopes	70
1812	Terril loam, sandy substratum, 1-6% slopes	80
1819G	Dorerton-Rock outcrop complex, very steep	10
1832C	Ostrander-Dowagiac loams, 6-12% slopes	65
1846dr.	Kato silty clay loam, depressional	70
1846	Kato silty clay loam	40
	Water	0
	Highway	0
	Pit	0
	Urban area	0

APPENDIX C1

SOILS FOR WHICH EROSION PLAN MAY BE WAIVED BY ADMINISTRATOR

		SOIL LOSS RATE WITH NO MULCH	RATE WITH 50% MULCH	RATE WITH 70% MULCH & SEED	ACRES SOIL IN COUNTY
25	BECKER	2.70	.54	.16	3,695
27A	DICKINSON	2.70	.54	.16	1,820
252	MARSHAN	3.78	.75	.22	880
298	RICHWOOD	3.78	.75	.22	2,805
313	SPILLWOOD	4.20	.84	.25	1,715
463	MINNEISKA	3.78	.75	.22	500
465	KALMARVILLE	3.78	.75	.22	3,600
467	SAWMILL	3.78	.75	.22	3,125
483A	WAUKEE	3.60	.72	.21	5,435
485	LAWLER	3.78	.75	.22	1,715
486	MARSHAN	3.36	.67	.20	800
485	ZUMBRO	2.29	.45	.13	535
1013	PITS	.00	.00	.00	300
1029	PITS	.00	.00	.00	235
1039	URBAN	.00	.00	.00	1,220
1078	UDORTHENTS	.00	.00	.00	440
1846	KATO	3.78	.78	.22	2,930
TOTAL		.00	.00	.00	31,750

APPENDIX C2

**SOILS FOR WHICH EROSION PLAN MAY BE WAIVED BY ADMINISTRATOR IF MULCH
APPLIED AT 50 PERCENT**

SOIL	NAME	SOIL LOSS RATE WITH NO MULCH	RATE WITH 50% MULCH	RATE WITH 70% MULCH AND SEED	ACRES OF SOIL IN COUNTY
25	OSTRANDER	5.88	1.17	.35	2,010
2B	OSTRANDER	22.26	4.45	1.33	1,015
16	ARENZVILE	6.10	1.22	.36	5,860
19	CHASEBRUG	11.10	2.22	.66	9,805
23	SKYBERG	7.77	1.55	.46	3,210
24	KASSON	10.56	2.11	.63	7,315
27b	DICKINSON	14.10	2.82	.84	1,145
30b	KENYON	22.26	4.45	1.33	9,275
99b	RACINE	10.56	2.11	.63	9,740
131b	MASBACH	22.56	4.51	1.35	895
143	BELEVA	15.48	3.00	.92	2,575
176	GARWIN	5.04	1.00	.30	10,570
203	JOY	10.50	2.10	.63	7,795
209A	KEGONSA	5.76	1.15	.34	1,260
209B	KEGONSA	22.56	4.51	1.35	1,335
216	BLAMONT	10.08	3.81	1.14	910
283B	PLAINFIELD	6.63	1.32	.39	2,050
285A	PORTBYRON	6.72	1.34	.40	20,795
285B	PORTBYRON	18.24	3.64	1.09	4,890
289	RADFORD	5.04	1.00	.30	4,685
295	READLYN	7.20	1.44	.43	2,680
299A	ROCKTON	5.88	1.17	.35	7,145
299	BROCKTON	24.36	4.87	1.46	6,600
312B	SHULLSBURG	19.20	3.84	1.15	1,240
333	VASA	12.96	2.59	.77	1,135
378	MAXFIELD	5.04	1.00	.30	9,560
468	OTTER	8.40	1.68	.50	11,150
471	ROOT	9.60	1.92	.57	2,380
475B	BACKBONE	16.92	3.38	1.01	1,400
476B	FRANKVILLE	20.64	4.12	1.23	2,620
479	FLOYD	13.68	2.73	.82	9,055
483B	WAUKRR	16.92	3.38	1.01	3,925
487	HOOPESTON	19.74	3.94	1.18	515
489A	ATKINSON	5.88	1.17	.35	3,120
489B	ATKINSON	19.74	3.94	1.18	3,840
491B	WAUCOMA2	4.36	4.87	1.46	2,175
492B	NASSET	20.64	4.12	1.23	920
493B	ORONOCO	20.64	4.12	1.23	1,455
516A	DOWAGIAC	5.04	1.00	.30	610
516B	DOWAGIAC	19.74	3.94	1.18	1,715
528B	PALMS	11.98	2.39	.71	665
1811B	LAMONT-RACINE	22.56	4.511	.35	2,425
1812B	TERRIL	13.92	2.78	.83	3,240
TOTAL		.00	.00		186,705

APPENDIX C3

**SOILS FOR WHICH EROSION PLAN MAY BE WAIVED BY ADMINISTRATOR IF MULCHED
AND SEEDED AT 70%**

SOIL	NAME	SOIL LOSS RATE WITH NO MULCH	RATE WITH 50% MULCH	RATE WITH 70% MULCH AND SEED	ACRES OF SOIL IN COUNTY
11C	SOGN LOAM	41.58	8.31	2.49	1,835
27C	DICKINSON	30.00	6.00	1.80	1,965
42E	SALIDA	52.50	10.50	3.15	1,645
99C	RACINE	52.80	11.61	3.48	1,060
131D	MASSBACH	62.40	12.48	3.74	485
143C	ELEVA	39.60	7.92	2.37	900
244C	LILAH	28.50	5.70	1.71	945
283C	PLAINFIELD	28.05	5.61	1.68	575
285C	PORT/BYRON	43.20	8.64	2.59	4,650
299C	ROCKTON	46.20	9.24	2.77	1,380
301B	LINDSTROM	25.44	5.08	1.52	6,430
309C	SCHAPVILLE	38.12	16.22	4.86	755
312C	SHULLSBURG	57.60	11.52	3.45	2,070
340B	WHALEN	27.84	5.56	1.67	5,000
340C	WHALEN	58.081	1.61	3.48	2,970
369B	WAUBEEK	27.84	5.56	1.67	3,995
369C	WAUBEEK	62.40	12.48	3.74	2,320
401B	MT. CARROLL	27.84	5.56	1.67	35,415
401C	MT. CARROLL	62.40	12.48	3.74	13,025
401C2	MT. CARROLL	80.64	16.12	4.83	14,475
472B	CHANNAHON	33.30	6.66	1.99	7,705
472C	CHANNAHON	45.51	9.10	2.73	7,105
474B	HAVERHILL	34.41	6.88	2.06	1,125
476C	FRANKVILLE	58.08	11.61	3.48	4,790
477A	LITTLETON	48.00	9.60	2.88	4,430
477B	LITTLETON	27.94	5.56	1.67	4,310
478B	COGON	25.55	5.08	1.52	3,290
484C	EYOTA	36.30	7.26	2.17	630
492B	NASSET	58.08	11.61	3.48	840
493C	ORONOCO	48.00	9.60	2.88	1,405
493D	ORONOCO	82.80	16.56	4.96	210
516D	DOWAGIAC	30.00	6.00	1.80	2,050
1832C	OST. DOWAGIAC	42.00	8.40	2.52	1,510
TOTAL		.01	00	.00	144,200

APPENDIX C4

SOILS NEEDING EROSION PLAN IN ALL CASES

SOIL	NAME	SOIL LOSS RATE WITH NO MULCH	RATE WITH 50% MULCH	RATE WITH 70% MULCH AND SEED	ACRES OF SOIL IN COUNTY
11C	SOGN LOAM	41.58	8.31	2.49	1,835
27C	DICKINSON	30.00	6.00	1.80	1,965
73F	BELLECHESTER	216.00	43.20	12.96	705
99D2	RACINE	120.00	24.00	7.20	695
173F	FRONTENAC	444.00	88.80	26.64	2,215
251F	MARLEAN	324.00	64.80	19.44	7,595
251G	MARLEAN	1,008.00	201.60	60.48	1,905
283E	PLAINFIELD	114.75	22.95	6.88	480
301C	LINDSTROM	134.40	26.88	8.05	1,405
309D	SCHAPVILLE	202.80	40.41	12.12	275
322C	TIMULA	8.80	17.76	5.32	6,360
322D	TIMULA	138.75	27.75	8.32	3,995
322E	TIMULA	227.55	45.51	13.65	830
401D	MT.CARROLL	144.00	28.80	8.64	2,860
401D2	MT.CARROLL	120.00	24.00	7.20	2,310
401E	MT.CARROLL	240.00	48.00	14.40	840
473D	DORERTON	254.40	50.88	15.26	4,005
473F	DORERTON	480.00	96.00	28.80	2,710
484E	EYOTA	115.80	23.16	6.94	3,170
488F	BRODALE	300.00	60.00	18.00	2,695
488G	BRODALE	840.00	168.00	50.40	1,455
593D	ELBAVILLE	156.00	31.20	9.36	3,955
593E	ELBAVILLE	288.00	57.60	17.28	2,095
898F	BRODALE-BELL	480.00	96.00	28.80	835
973D	BRODALE-BELL	180.00	37.80	11.34	1,260
1819G	DORERTON-ROC	1,344.00	268.80	80.64	565
TOTAL		.14	.02	.00	55,215

APPENDIX D

The Universal Soil Loss Equation

The Universal Soil Loss Equation is a formula used by soils scientists and soils conservationists to estimate soil loss from sheet and rill water erosion from sites. The equation calculates expected soil loss in tons per acre per year (A) as the product of:

1. A basic factor reflecting the impact of normal rainfall in the area (R);
2. A factor reflecting the erodability of the soil on the site (K);
3. A factor reflecting the length and steepness of slope on the site (LS);
4. A factor reflecting the vegetative or other cover conditions on the site (C); and
5. A factor reflecting practices applied to reduce soil loss, such as diversions, terraces, and sediment traps

The form of the equations, using the symbols described above, is:

$$A=(R) (K) (LS) (C) (P).$$

The following is an example of the application of this formula to a site in Southeastern Minnesota, on Port Byron soils with an average slope of seven (7%) percent, and a slope length of one hundred fifty (150) feet, in a bare ground condition, with no erosion control practices applied.

$$\begin{aligned} & \mathbf{A \text{ (soil loss rate in tons per acre per year)}} \\ & \mathbf{= 150 \text{ (rain fall factor in Southeastern Minnesota)}} \\ & \mathbf{X 0.32 \text{ (K factor for Port Byron Soils)}} \\ & \mathbf{X 0.43 \text{ (cover factor for bare soil with no mulch cover)}} \\ & \mathbf{X 0.90 \text{ (LS factor for a slope of 7\% that is 150 feet long)}} \\ & \mathbf{X 1.00 \text{ (practice factor for no control measures)}} \\ & \mathbf{= 18.58 \text{ tons per acre per year.}} \end{aligned}$$

Applying mulch at seventy (70%) percent cover rate to this same property would change the result to:

$$\mathbf{A = 150 X 0.32 X 0.08 X 0.90 X 1.0 = 3.46 \text{ tons per acre per year.}}$$

Information on K and average LS factors for soils occurring in Olmsted County is available from the Zoning Administrator. Cover factors for various rates of mulching and seeding are available from the U.S. Soil Conservation Service District Office.

APPENDIX E

Hydrologic Curve Numbers

The average "hydrologic curve number" or "runoff curve number" is a measure of the likelihood that rain falling on a site will leave the site in the form of runoff. The development of urban uses frequently results in an increase in impervious surface area, and thus in increased rates of runoff. This, in turn, causes downstream flooding to increase in frequency and severity.

Table E-1 presents typical hydrologic curve numbers for different types of land areas. The steps used to determine the change in average Curve Number for a development site are as follows:

1. Determine the acreage of each existing combination of soil and land cover combination.
2. Group the soil and land cover combinations by combinations of land cover and hydrologic soil group (obtainable in the Olmsted County Soil Survey, or from the Rochester-Olmsted Planning Department, and total the acreage in each classification.
3. Compute the weighted average curve number, using the values from Table E-1, by multiplying the appropriate curve number by the acreage in the classification, totaling for all classifications and dividing by the total acreage of the site.
4. Repeat steps (1) through (3) for the land cover and soil type in the development site, using curve numbers from Table E-1.
5. Divide the result of step (4) by the result of step (3) to determine the percentage change in curve numbers.

The following example illustrates the application of this process to a development site. The site has the following combinations of soil type and land cover:

Step 1:

	Soil Type	Land Cover	Acres
283B	Plainfield	cropland, not treated	16.8
283C	Plainfield	cropland, not treated	3.2
1812B	Terril	cropland, not treated	13.6
465	Kalmarville (undrained)	woodland, good cover	6.4
Total			40.0

Step 2:

Grouped by hydrologic soil type, the soil has the following characteristics:

Hydrologic Soil Group	Land Cover	Curve Number	Hydrologic Acres
A	untreated cropland	72	20.0
B	untreated cropland	81	13.6
C	woodland, good cover	70	6.4

Step 3

The weighted average hydrologic curve number is derived as follows:

$$\begin{aligned} & (72 \times 20.0) + (70 \times 6.4) + (81 \times 13.6) \\ & = (144.0 \times 448.0 \times 1101.6) \\ & = (2989.6) \text{ divided by total area of 40 acres} \\ & = 74.8 \text{ average curve number.} \end{aligned}$$

Step 4

If the site is to be developed as a residential subdivision with two-acre lots, the analysis of expected runoff curves might proceed as follows:

Soil Group	Land Cover	Curve Number	Acres
Any	Impervious (paved and roof areas)	98	1.6
A	Gravel Areas	76	0.9
D	Woodland (not grazed 77	77	6.4
A	Lawn Areas	39	17.5
	Lawn Areas	61	13.6
Total:			40.0

Repeating the calculation above:

$$\begin{aligned} & (98 \times 1.6) + (76 \times 0.9) + (77 \times 6.4) + (39 \times 17.5) + (61 \times 13.6) \\ & = (156.8) + (68.4) + (492.8) + (829.6) \\ & = (2230.1) \text{ divided by total area of 40 acres} \\ & = 55.8 \text{ average curve number.} \end{aligned}$$

Step 5

To determine the percentage change in curve number, divide 55.8 by 74.8. The result is .75, representing a 25% reduction in the curve number for the site.

TABLE E-1

LAND USE DESCRIPTION	HYDROLOGIC SOIL GROUP			
	A	B	C	D
Cultivated Land⁽¹⁾:				
Without conservation treatment	72	81	88	91
With conservation treatment	62	71	78	81
Pasture or Range Land:				
Poor condition	68	79	86	89
Good condition	39	61	74	80
Meadow:				
Good condition	30	58	71	78
Wood for Forest Land:				
Thin stand, poor cover, no mulch	45	66	77	83
Good cover ⁽²⁾	25	55	70	77
Open Spaces, Lawns, Parks Golf Courses, Cemeteries, etc.				
Good conditions: grass cover on 75% or more of the area	39	61	74	80
Fair condition: grass cover on 50% to 75% of the area	49	69	79	84
Commercial and Business Areas				
(85% impervious)	89	92	94	95
Industrial Districts				
(72% impervious)	81	88	91	93
Residential:⁽³⁾				
Average Lot Size	Average % Impervious⁽⁴⁾			
1/8 acre or less	65	77	85	90
1/4 acre	38	61	75	83
1/3 acre	30	57	72	81
1/2 acre	25	54	70	80
1 acre	20	51	68	79
Paved Parking Lots, Roofs, Driveways, etc.⁽⁵⁾				
	98	98	98	98
Streets and Roads:				
Paved with curbs and storm sewers. ⁽⁵⁾	98	98	98	98
Gravel	76	85	89	91
Dirt	72	82	87	89

- 1) For a more detailed description of agricultural land use curve numbers, refer to National Engineering Handbook, Section 4, Hydrology, Chapter 9, Aug., 1972.
- 2) Good cover is protected from grazing and litter and brush cover soil.
- 3) Curve numbers are computed assuming the runoff from the house and driveway is directed towards the street with a minimum of roof water directed to lawns where additional infiltration could occur.
- 4) The remaining pervious areas (lawn) are considered to be in good pasture condition for these curve numbers.
- 5) In some warmer climates of the county a curve number of 95 may be used.

APPENDIX F WIND EROSION EQUATION

The Wind Erosion Equation (WEE) used in the administration of this ordinance is a series of formulas derived from tables and nomographs published by the Soil Conservation Service in December, 1975 (Minnesota USDA, SCS, Technical Guide Section III-A, Par II). The WEE relates wind erosion to five factors, including the following:

1. **Soil Erodibility Index (I)**, a factor reflecting the texture and other characteristics which determine the tendency of bare, level smooth soil to erode;
2. **Ridge Roughness (K)**, a factor reflecting non-vegetative surface obstructions to wind erosion resulting from tillage practices;
3. **Climate (C)**, reflecting the probability that the weather will be dry enough and windy enough for soil to dry out and erode;
4. **Length of Unsheltered Distance (L)**, reflecting the distance from the nearest obstruction to wind flow; and
5. **Vegetative Cover (V)**, a factor reflecting the percentage of the surface covered by residues. The factor reflects the quality, quantity, and the orientation of the residue, and is expressed in terms of tons of "equivalent flat small grain residue."

The formulas relied on in the administration of this ordinance replicate the results obtained from the nomographs. The overall formula has the form:

$$\begin{aligned} \text{WEE} &= I' * R * D * Y, \text{ where} \\ I' &= I * K * C / 100, \\ R &= \{\ln I' * .030207 + .75\} \{V/250\}^{1.65} \\ D &= \ln L * .241 + \{1 - (I'' * -0.105146 = 9.235) * .241\} \\ Y &= \text{a rotation factor reflecting the percentage of the rotation in} \\ &\quad \text{which the soil is exposed to wind erosion.} \end{aligned}$$

When WEE is above five tons, an additional adjustment formula is applied: **WEE' = SE * 1.088**.

The I factor is derived directly from published soils data. The C factor for Olmsted County has a value of eight (8). K and V vary with tillage practices. For the purposed of estimating wind erosion using grid cell computer maps, average K and V values were assigned to each of the twelve (12) cropland types identified in land cover mapping. L values were assigned on the basis of the location of the soil type in the landscape, and on the type of cropland identified in land cover mapping.

APPENDIX G IDENTIFICATION OF PRIORITY CONSERVATION AREAS

The identification of priority conservation areas relies on a computer system to evaluate two types of erosion (wind and sheet and rill erosion) and the potential for runoff problems. In addition, in order to protect the flood control project reservoirs from excessive sedimentation, a factor reflecting location in a flood control watershed is reflected.

The system relies on computerized maps of both soils and land cover to estimate the factors related to soil erosion. The Universal Soil Loss Equation and a computerized version of the SCS Wind Erosion Equation are applied to the map data, with the resulting estimates compared to the tolerable soil loss factors (see Table 1). Those areas not meeting tolerable loss are then ranked in order of the degree to which they are not in compliance with the standards of Section 10.21. The ranking system assigns points and weights for three types of non-compliance, as follows:

1. **Total Erosion:** Three levels of noncompliance are scored. For the worst ten (10) percent of noncomplying parcels, a score of eighteen (18) points is assigned. The next worse ten (10) percent is assigned a score of twelve (12) points. The following thirty (30) percent of noncomplying parcels are assigned six (6) points.
2. **Ratio of Total Erosion to Tolerable Soil Loss:** For the worst ten (10) percent of noncomplying parcels, a score of three (3) points is assigned. The next worse ten (10) percent is assigned a score of two (2) points. The following thirty (30) percent of noncomplying parcels are assigned one (1) point.
3. **Excessive Rates of Runoff:** Sites having a hydrologic curve number over 81 are assigned a score of three (3) points. That curve number is the highest level that applies to well-managed cropland. In addition, sites identified from aerial slides as poorly managed pasture are assigned three (3) points.
4. **Flood Control Project Watershed:** Sites within the watershed of the PL 566 portion of the South Zumbro Watershed Project are assigned nine (9) points.

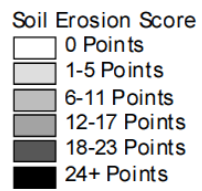
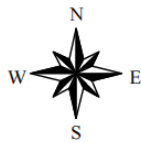
It should be emphasized that this ranking system will be used to identify sites for on-site investigation only, and not as a basis for immediate enforcement efforts. If on-site investigation confirms the existence of a problem, then the procedures outlined in Sections 10.21 E and F will be initiated.

The method was tested by applying the formulas to sites included in the 1982 National Resources Inventory (NRI) and matching the resulting erosion values against the values arrived at manually. Comparing estimates with site specific values yields the following results:

Estimates exceeding NRI values by 1 ton or more:	0%
Estimates within 1 ton of NRI values:	77%
Estimates within 1.5 tons of NRI values:	96%
Underestimates of NRI by more than 1 ton:	23%
Underestimates of NRI by more than 1.5 ton:	4%




Soils professionals assisting with this project have concluded that the method provides a reasonable basis for determining priorities for on site inspection of potential erosion problems.

SALEM TOWNSHIP



FLOOD CONTROL PROJECT WATERSHEDS



-  Major Highways
-  Township Boundaries
-  Flood Control Project Watersheds

**TABLE 1
SOIL LOSS TOLERANCE FACTORS FOR SOILS IN OLMSTED COUNTY**

SYMBOL	APPROVED NAME	TONS/ACRE/YEAR
2A	Ostrander Silt Loam, 0-2% Slopes	5
2B	Ostrander Loam, 2-6% Slopes	5
11C	Sogn Loam, 4 - 12% slopes	1
16	Arenzville silt LOAM	5
19	Chaseburg silt loam	5
23	Skyberg silt loam	5
24	Kasson silt loam	5
25	Becker loam	4
27A	Dickinson sandy loam, 0 -1% slopes	4
27B	Dickinson sandy loam 2 - 6% slopes	4
27C	Dickinson sandy loam 6 - 12% slopes	4
30B	Kenyon loam, 1 - 6% slopes	5
42E	Salida gravelly sandy loam, 12 - 35% slopes	3
73F	Bellechester loamy sand, 25 - 45% slopes	5
99B	Racine silt loam, 1 - 6% slopes	5
99D	Racine loam, 6 - 12% slopes	5
99D2	Racine loam, 12 - 18% slopes, eroded	5
131B	Massbach silt loam, 2 - 6% slopes	4
131D	Massbach silt loam, 12 -18% slopes	4
143B	Eleva sandy loam, 2 - 6% slopes	4
143C	Eleva sandy loam, 6 - 12% slopes	4
173F	Frontenac loam, 15 - 35% slopes	4
176	Garwin salty clay loam	5
203	Joy silt loam, 1 - 4 % slopes	5
209A	Kegonsa silt loam, slopes greater than 4%, 0 - 2% slopes	4
209B	Kegonsa silt loam, 2 - 6% slopes	4
216B	Lamont sandy loam, 2 - 6% slopes	5
244c	Lilah sandy loam, 2 - 6% slopes	2
251F	Marlean silt clay loam, 25 - 40% slopes	2
251G	Marlean silty clay loam, 40 - 80% slopes	2
252	Marshan silt loam	4
283B	Plainfield loamy sand, 0 - 6% slopes	5
283C	Plainfield sand, 6 - 12% slopes	5
283E	Plainfield sand, 12 - 30% slopes	5
285A	Port Byron, silt loam, 0 - 1% slopes	5-4
285B	Port Byron, silt loam, 1 - 2% slopes	5-4
285C	Port Byron, silt loam, 5 - 9%	5-4
289	Radford silt loam	5
295	Readlyn loam	5
298	Richwood silt loam, 1 -2% slopes	5
299A	Rockton loam, 0 - 1%	4
299B	Rockton loam 1 - 6%	4
299C	Rockton loam, 6 - 12% slopes	4
301B	Lindstrom silt loam, 2 - 6% slopes	5
301C	Lindstrom silt loam. 6 - 15% slopes	5
309C	Schapville siltyclay loam, 6 - 12% slopes	2
309D	Schapville siltyclay loam, 12 - 25% slopes	2
312B	Shullsburg silt loam. 2 - 6% slopes	4

SYMBOL	APPROVED NAME	TONS/ACRE/YEAR
312C	Shullsburg silt loam, 6 - 12% slopes	4
313	Spillville silt loam	5
322C	Timula silt loam, 6 - 12% slopes	5-4
322D	Timula silt loam, 12 - 18% slopes	5-4
322E	Timula silt loam, 18 - 30% slopes	5-4
333	Vasa silt loam	5
340B	Whalan loam, 1 - 6% slopes	4
340C	Whalan loam, 6 - 12% slopes	4
369B	Waubeek silt loam, 1 - 6% slopes	5-4
369C	Waubeek silt loam, 6 - 12% slopes	5-4
378	Maxfield siltyclay loam	5
401B	Mt. Carroll silt loam, 2 - 6% slopes	5-4
401C	Mt. Carroll silt loam, 6 - 12% slopes	5-4
401C2	Mt. Carroll silt loam, 6 - 12% slopes, eroded	5-4
401D	Mt. Carroll silt loam, 12 - 18% slopes	5-4
401D2	Mt. Carroll silt loam, 12 - 18% slopes, eroded	5-4
401E	Mt. Carroll silt loam, 18 - 25% slopes	5-4
463	Minnieska loam, occasionally flooded	5
465	Kalmarville silt loam	5
467	Sawmill silty clay loam	5
468	Otter silt loam, channeled	5
471	Root silt loam	4
472B	Channahon loam, 1 - 6% slopes	2-1
472C	Channahon loam, 6 - 12% slopes	2-1
473D	Dorerton loam, 12 - 24% slopes	2
473F	Dorerton loam, 25 - 40% slopes	2
474B	Haverhill siltyclay loam, 1 - 8% slopes	4
475B	Backbone sandy loam, 1 - 6% slopes	4
476B	Frankville silt loam, 1 - 6% slopes	4
476C	Frankville silt loam, 6 - 12% slopes	4
477A	Littleton silt loam, 0 - 1% slopes	5
477B	Littleton silt loam, 1 - 4% slopes	5
478B	Coggon silt loam, 2 - 6% slopes	5-4
479	Floyd silt loam, 1 - 4% slopes	5
483A	Waukee loam, 0 - 2% slopes	4
483B	Waukee loam, 2 - 6% slopes	4
484C	Eyota sandy loam 6 - 12% slopes	5
484E	Eyota loamy sand, 12 - 25% slopes	5
485	Lawler loam	4
486	Marshan silt loam, depressional	4
487	Hoopeston sandy loam	4
488F	Brodale flaggy loam, 24 - 40% slopes	2
88G	Brodale flaggy sandy loam 40 - 80% slopes	2
489A	Atkinson loam, 0 - 1% slopes	4
489B	Atkinson loam, 1 - 6% slopes	4
491B	Waucoma loam, 2 - 6% slopes	4
492B	Nasset silt loam, 2 - 6% slopes	4-3
492C	Nasset silt loam, 6 - 12% slopes	4-3
493B	Oronoco loam, 2 - 6% slopes	5-4
493C	Oronoco loam, 6 - 12% slopes	5-4
493D	Oronoco loam, 6 - 12% slopes	5-4

SYMBOL	APPROVED NAME	TONS/ACRE/YEAR
495	Zumbro loamy sand	5
516B	Dowagiac loam, 0 - 2% slopes	4
516B	Dowagiac silt loam, 2 - 6% slopes	4
516C	Dowagiac sandy loam, 6 - 12% slopes	4
528B	Palms muck, 1 - 6% slopes	--
593D	Elbaville silt loam, 12 - 18% slopes	4
593E	Elbaville silt loam, 18 - 30% slopes	4
898F	Brodale-Bellechester complex, 25 - 60% slopes	
	Brodale	2
	Bellechester	5
973D	Brodale-Sogn complex, 12 - 25% slopes	
	Brodale	2
	Sogn	1
1013	Pits, quarry	0
1029	Pits, gravel	0
1039	Urban land	0
1078	Udorthents	0
1811B	Lamont	5